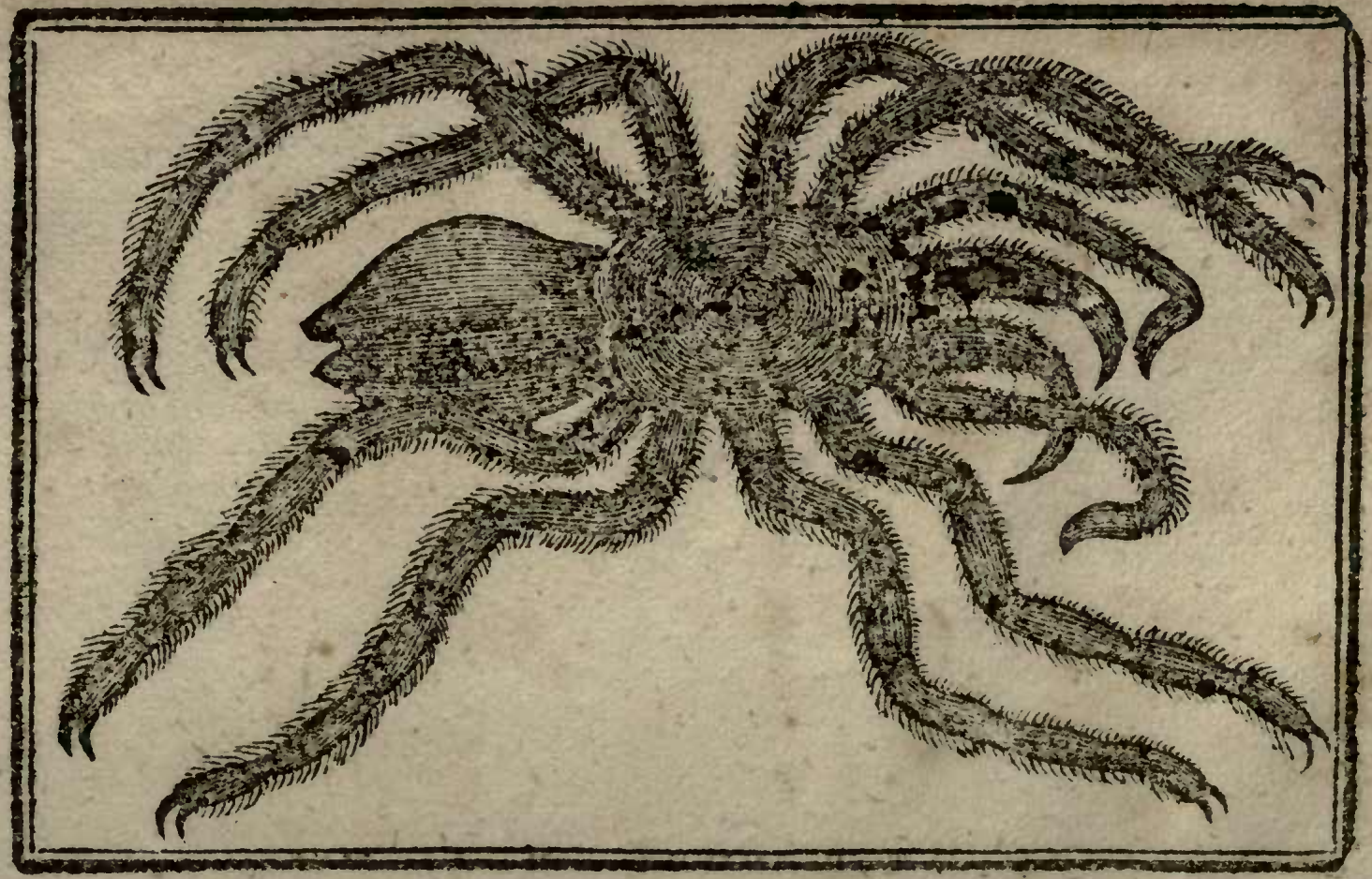

THE BIRD-CATCHING SPIDER.—See Page 153.

THE

NATURAL HISTORY

OF

REMARKABLE

INSECTS,

WITH THEIR HABITS AND INSTINCTS.

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"*Go to the Ant, thou Sluggard; consider her ways, and be wise; which, having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest.*"

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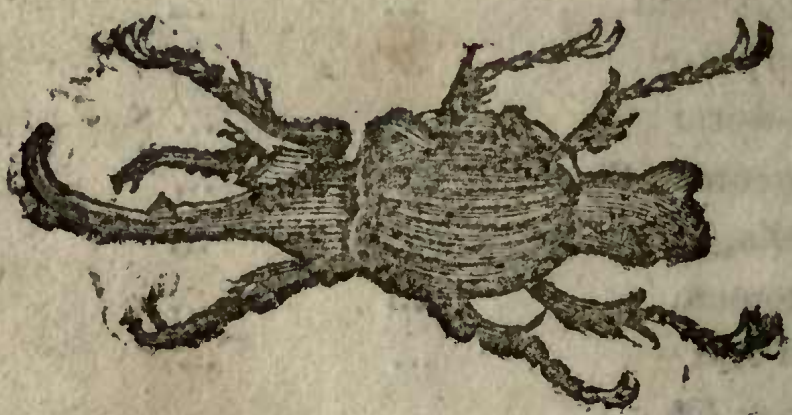


PREFACE.

There is no branch of Natural History better calculated to instruct than that which treats of Insects. It will shew us, that in the smallest, as well as in the largest of animated beings, each is adapted in the most wonderful manner to its peculiar state, and performs a distinct part in the economy of Nature.

Delightful, however, as the study may be, amusement is not its sole, nor even its principal object: as we become better acquainted with the various inhabitants of this world, and observe the wisdom, power, and benevolence of the Almighty, apparent in these which are the lowest of his works, it cannot fail to call forth our adoration of that Power by whom all things are formed.

This little Work is also intended to convey another important lesson to the young or thoughtless; that since Providence has afforded even to Insects the means of comfort and enjoyment, furnished them with such admirable instincts, and given them such a wonderful structure, we read to little purpose, unless we learn humanity towards every thing that breathes—and to admire rather than torment or destroy what GOD has created.

INTRODUCTORY REMARKS.

AS Insects are endowed with the various powers of creeping, flying, and swimming, there is scarcely any place where they are not to be found:—earth, air, water, and even the bodies of the larger animals, teem with them.

Insects are very short-lived; few of them survive a year, many do not live half that time, and the existence of some does not extend beyond a day. This law of their nature is not without exceptions: bees, some butterflies, and spiders, are said to live a considerable time.

Insects, like other animals, are generally of two sexes, male and female; but amongst such as live in communities, as ants, bees, &c. the greater number are of neither sex. These

neuters, as they are called, are the labourers of the family; they build the cells, collect provisions, and perform the whole interior economy.

The most surprising circumstance in the history of insects, remains yet to be related. The same insect, at different periods of its existence, frequently undergoes several changes, and assumes forms so various, that it is impossible to be recognised by any person unacquainted with its transformations.

These transformations are common to all insects, except those of the class without wings, and afford in the different kinds, a curious variety in colour, form, and circumstances. The egg is called the first state, and the insect that is hatched from it, whether caterpillar, worm, maggot, or grub, is denominated the *larva*; which signifies a mask, because in that, which is its second state, the perfect insect is concealed in another form.

The third state is most properly expressed by the term *pupa*, from its fancied resemblance to a

doll wrapped in swaddling clothes; but it is also called the *chrysalis*, or *aurelia*; and is still distinguished by different names, as cod, cone, or nymph.

The last change is into the perfect insect, frequently rising from a torpid, inanimate state, to soar in the air, and rove, with painted wings, from flower to flower.

Insects possess some particular parts which are not to be found in any of the larger animals. Among these are the *antennæ*, which are generally termed the horns. They are those processes or jointed bodies, situated on each side of the head. The use of these parts is not entirely understood. It has by some been imagined that they are the instruments of hearing.

Besides the *antennæ*, insects are furnished with feelers, which are also jointed, and are fixed to the mouth: they are generally four or six in number, and seem to serve the insect instead of hands, to bring the food to the mouth, and hold it whilst eating.

The most curious and surprising part of insects is their eyes, which, in the same creature, are often of several kinds. Besides the two eyes placed on each side of the head, which deserve a particular description, many insects have three small, round, brilliant globules on the crown of the head, called *stemmata*. The eyes of most insects, instead of being single, are composed of a prodigious number of little hemispheres, or round protuberances, placed with the utmost regularity and exactness, in lines crossing each other like lattice work: this group is supposed to be a collection of eyes.

Leuwenhock, a celebrated naturalist, looked through the eye of an insect, by the assistance of a microscope, and viewed the steeple of a church, which was 295 feet high, and 790 feet from the place where he stood: yet he discerned the steeple plainly, though it did not appear bigger than the point of a large needle. He afterwards turned his minute telescope, for so it may justly be called, towards a house, and clearly distinguished the doors and windows, and whether

they were open or shut. The same gentleman reckons, in the two eyes of a dragon-fly, 25,088 of these minute hemispheres.

The pictures of objects seen through these eyes, must be millions of times smaller than those of the same objects painted on the retina of the human eye. There is no doubt that insects, too small to be clearly seen without a microscope, have eyes contrived to discern objects many thousand times less than themselves, for so the particles of their food must certainly be. Such calculations almost exceed the power of imagination, and are a convincing proof, that the exquisite harmony of creation is as visible in the minute, as the vast objects that surround us.

ON THE BEAUTY OF INSECTS.

Observe the insect race, ordain'd to keep
The lazy sabbath of a half year's sleep.
Entomb'd beneath the filmy web they lie,
And wait the influence of a kinder sky.

When vernal sun-beams pierce their dark retreat,
The heaving tomb distends with vital heat;
The full-form'd brood, impatient of their cell,
Start from their trance, and burst their silken shell.
Trembling awhile they stand, and scarcely dare
To launch at once upon the untried air;
At length assur'd, they catch the fav'ring gale,
And leave their sordid spoils, and high in æther sail.

Lo, the bright train their radiant wings unfold,
With silver fringed, and freckled o'er with gold.
On the gay bosom of some fragrant flower,
They idly flutt'ring live their little hour;
Their life all pleasure, and their task all play,
All spring their age, and sun-shine all their day.
Not so the child of sorrow, wretched man!
His course with toil concludes, with pain began:
That his high destiny he might discern,
And in misfortune's school this lesson learn,—
Pleasure's the portion of th' inferior kind;
But glory, virtue, Heaven for man design'd.

What atom forms of insect life appear!
And who can follow Nature's pencil here?
Their wings with azure, green, and purple gloss'd,
Studded with colour'd eyes, with gems emboss'd,
Inlaid with pearl, and mark'd with various stains
Of lively crimson, through their dusky veins.
Some shoot like living stars athwart the night,
And scatter from their wings a vivid light.

See the proud giant of the Beetle race,
What shining arms his polish'd limbs enchace
Like some stern warrior formidably bright,
His steely sides reflect a gleaming light;
On his large forehead spreading horns he wears,
And high in air the branching antlers bears.
O'er many an inch extends his wide domain,
And his rich treasury swells with hoarded grain.

THE HERCULES BEETLE.

NATURAL HISTORY

OF

REMARKABLE INSECTS.

THE BEETLE.

THE Beetle, like all other winged insects, without exception, is bred from an egg, which undergoes three different changes before the little animal appears in its perfect state. From its egg state it becomes a worm, then a chrysalis, in which the parts of the future fly are distinctly seen, though covered up as if in a case; and lastly, the animal leaves its prison, breaking forth as a winged insect in full maturity.

Insects of the Beetle tribe have one peculiarity, in which they differ from all others; they are furnished with cases to their wings, in which they can enclose them at pleasure. These afford us striking instances how admirably Nature adapts her creatures for the life they are to lead. Beetles often live under ground in holes, which they dig out by their own industry; these sheaths, therefore, prevent the various injuries their wings might receive from rubbing against the sides of their abode.

The strength of the Beetle also fits it for digging its underground habitation; their muscles are formed very like those of quadrupeds, and are endued with such surprising force, that bulk for bulk they are a thousand times stronger than than those of a man.

The largest of this kind is called the Elephant Beetle, and is a native of South America. It sometimes measures not less than six inches in length, and is covered with a very hard shell, as thick and as strong as that of a crab; it is furnished with an enormous beak. The wing shells are inclined to blue, marked with round black spots, and the head and limbs are of a jet black.

THE COCK-CHAFFER.

The Cock-chaffer, another animal of the beetle tribe, resembling that we have just described, is a very mischievous insect, both in its caterpillar and perfect state: in the former, it lives in ploughed lands, and makes dreadful havoc among the roots of grass and corn. The cock-chaffer has sometimes appeared in such numerous swarms, as to strip the trees of their foliage, and threaten a famine; but in the wise arrangement of Nature, where an evil prevails, a remedy is provided to cure or mitigate it. This insect, whilst a grub, and after it gets its wings, is the prey of many

species of birds, which thin its numbers, and in general prevent them from increasing beyond a due proportion. The larva is very small at first, and is two or three years in attaining its full size, when it undergoes its change to a chrysalis; in which state it remains till the succeeding summer; it then emerges from its tomb, and after enjoying the pleasure of an improved existence for some time, lays its eggs in the ground, and dies.

At the latter end of the seventeenth century, it appears that some particular districts in Ireland were overrun by this insect in a wonderful manner, and that the damage done by them was of the most serious description. The account is given as follows: "These insects first appeared in the year 1688, on the south-west coast of Galway, brought thither by a south-west wind; from thence they penetrated into the inland parts, towards Headford, about twelve miles north of the town of Galway: here and there in the adjacent country, multitudes of them appeared among the trees and hedges in the day-time, hanging by the boughs in clusters, like bees when they swarm. In this posture they continued, with little or no motion, during the heat of the sun; but towards evening, or sun-set, they would all disperse, and fly about, with a strange humming noise, like the beating of distant drums, and in such vast numbers, that they darkened the air for the space of two or three miles square

Persons travelling on the roads, or abroad in the fields, found it very difficult to make their way through them, they would so beat and knock themselves against their faces in their flight, and with such a force as to make the place smart, and leave a slight mark behind them. In a short time after their coming, they had so entirely eaten up and destroyed all the leaves of the trees, for some miles round, that the whole country, though in the middle of summer, was left as bare as in the depth of winter ; and the noise they made in gnawing the leaves, caused a sound much resembling the sawing of timber. They also came into the gardens, and destroyed the buds, blossoms, and leaves of all the fruit-trees, so that they were left perfectly naked ; nay, many that were more delicate than the rest, lost their sap as well as leaves, and quite withered away, so that they never recovered again. Their multitudes spread so exceedingly, that they infested houses, and became extremely offensive and troublesome.—Their numerous young, hatched from the eggs which they lodged under ground, near the surface of the earth, did still more harm in that close retirement, than all the flying swarms of their parents had done abroad ; for this destructive brood, lying under ground, eat up the corn and grass, and thus consumed the support both of man and beast. This plague was happily checked several ways. High winds, and wet drizzling weather, destroyed many millions of

them in a day; and when this constitution of air prevailed, they were so enfeebled, that they would let go their hold, and drop to the ground from the branches; and so little a fall as this was sufficient quite to disable, and sometimes perfectly kill them. Nay, it was observable, that even when they were most vigorous, a slight blow would for some time stun them, if not deprive them of life. In a little time, it was found that smoke was another thing very offensive to them; and by burning heath, fern, &c. the gardens were secured, or if the insects had already entered, they were thus driven out again. Towards the latter end of summer they retired of themselves, and so totally disappeared, that in a few days there was not one left."

We have mentioned, that the larva, or caterpillar of this insect is said to be two, and sometimes three years, in passing from its first form into that of the perfect insect. The eggs are laid in small detached heaps beneath the surface of the clod, and the young, when first hatched, are scarcely more than the eighth of an inch in length, gradually advancing in their growth, and occasionally shifting their skins, till they arrive at the length of nearly two inches. At this period, they begin to prepare for their change into a chrysalis, selecting for the purpose some small clod of earth, in which they form an oval cavity, and, after a certain time, divest themselves of their last skin, and immediately appear in the

chrysalis form, in which they continue till the succeeding summer. The change the animal afterwards undergoes, and the shortness of its life, after attaining a perfect form, have already been described.

THE BOMBARDIER.

This is another species of those insects whose wings are inclosed in a kind of case, to cover and wrap them up. It keeps itself concealed among the stones, and seems to make little use of its wings; when it moves, it is by a sort of jump; and, whenever it is touched, one is surprised to hear a noise resembling the discharge of a musket in miniature; during which, a blue smoke may be seen to proceed from the body of the animal. This insect may be made at any time to play off its little artillery by scratching its back with a needle. This operation it has the power of repeating ten, twelve, or even twenty times in succession; thus frequently escaping, by terrifying its pursuers, although the smoke emitted seems to be altogether inoffensive. Its chief enemy is a great carabus: when pursued, and fatigued, it has recourse to this stratagem, planting itself in the path of the carabus, which advances with open mouth and claws to receive it; but, on the discharge of this artillery,

suddenly draws back, and remains awhile confused; during which, the bombardier conceals himself in some neighbouring crevice; if, however, it is not happy enough to find one, the carabus returns to the attack, takes the insect by the head, and tears it off.

THE GLOW-WORM.

The Glow-worm is a highly curious and interesting animal, on account of its luminous appearance. It is seen in England, though not in this country, sparkling in the dusk of the evening, like a bright diamond, on some mossy bank or hedge-way. The animal itself, which is the female insect, measures about three quarters of an inch long, and is of a dull, earthy, brown colour on the upper parts, with the two or three last joints of the body of a pale, or whitish sulphur colour. It is from these parts that the phosphoric light above-mentioned proceeds, which is of a yellow colour, with a very slight cast of green. The Glow-worm is a slow moving insect, and in its manner of walking seems to drag itself on by starts, or slight efforts, as it were. The male is smaller than the female, and is provided both with wings and wing-sheaths, but is not luminous.

This curious property of shining by night, is given to the female, as a means of attracting the notice of the male, which, without the help of so bright a torch, would be at a loss to discover its mate in the dark.

When evening closes Nature's eye,
The Glow-worm lights her little spark,
To captivate her favorite fly,
And guide her lover thro' the dark.

In Italy, the flying Glow-worm is extremely plentiful; and we are informed by Dr. Smith, and other travellers, that it is a very common practice (and surely it is a very inhuman one) for ladies to stick them, by way of ornament, in different parts of their head-dress, during the evening hours.

The common, or wingless Glow-worm, may be very successfully kept, if properly supplied with moist turf, grass, moss, &c. for a considerable length of time; and as soon as the evening commences, will regularly exhibit its beautiful effulgence, illuminating every object within a small space around it; and sometimes the light is so vivid, as to be perceived through the box in which it is kept. This insect deposits its eggs, which are small and yellowish, on the leaves of grass, &c.

THE GLOW-WORM.

1

Beneath the hedge, or near the stream,
A worm is known to stray,
That shows by night a lucid beam,
Which disappears by day.

2

Disputes have been, and still prevail,
From whence his rays proceed;
Some give that honour to his tail,
And others to his head.

3

But this is sure—the hand of might,
That kindles up the skies,
Gives *him* a modicum of light,
Proportion'd to his size.

4

Perhaps indulgent Nature meant,
By such a lamp bestow'd,
To bid the traveller, as he went,
Be careful where he trod.

5

Nor crush a worm, whose useful light
Might serve, however small,
To show a stumbling stone by night,
And save him from a fall.

9

Whate'er she meant, this truth divine
Is legible and plain,
'Tis power Almighty bids him shine,
Nor bids him shine in vain.

7

Ye proud and wealthy, let this theme
Teach humbler thoughts to you;
Since such a reptile has its gem,
And boasts its splendour too.

THE DEATH-WATCH.

This insect has obtained its name from a groundless and absurd idea which formerly prevailed amongst the ignorant, that the beating noise made by the animal, was an omen of approaching death. This idle terror, which so often alarmed the peasant's family, is now fast wearing away; but it is a very singular circumstance, that an animal so common should not be more known, and its peculiar noise be more universally understood. Towards the latter end of spring, this harmless little animal commences its noise, which is only a call to its mate, and which may be considered as like the call of birds: though not owing to the voice of the insects, but to its beating on any hard substance with the

shield, or fore part of its head. The prevailing number of distinct strokes which it beats, is from seven to nine, or eleven; which very circumstance may perhaps add, in some degree, to the curious character which it bears among the vulgar. These sounds or beats, are given in pretty quick succession, and are repeated at uncertain intervals; and in old houses, where the insects are numerous, may be heard at almost every hour of the day, especially if the weather be warm. The sound exactly resembles that which may be made by beating moderately hard with a nail on a table. The insect is of a colour so nearly resembling that of decayed wood, viz. an obscure grayish brown, that it may, for a considerable time, elude the search of the inquirer. It is about a quarter of an inch in length, and moderately thick in proportion, and the wing shells are marked with numerous irregular variegations of a lighter or grayer cast than the ground colour. Incredible as it may appear, it is an animal that may in some measure be tamed; at least it may be so far familiarized, as to be made to beat occasionally, by taking it out of its confinement, and beating on a table or board, whenit will readily answer the noise, and will continue to beat as often as required. Dr. Derham had two Death-watches, a male and a female, which he kept alive in a box, for several months; and could bring one of them to beat whenever he pleased, by imitating its beating.

We must be careful not to confound this animal, which is the real Death-watch of the vulgar, emphatically so called, with a much smaller insect, of a very different genus, which makes a sound like the ticking of a watch, and continues it for a long time without intermission. It belongs to a totally different order, and is the *Termes Pulsatorium* of Linnæus.

THE EARWIG.

The common Earwig is an insect familiarly known; its structure, however, is highly curious, and its natural history well worthy of particular observation. The wings of this insect are remarkably elegant, and are rolled up in so many folds beneath their small sheaths, that they cannot be viewed without admiration: they are very large and transparent in proportion to the animal, though probably few careless observers know that they have any. The Earwig flies only by night, and it is not without great difficulty that it can be made to expand its wings by day; it is even probable that they would receive injury by any long exposure to the diurnal air; the animal, therefore, keeps them completely covered.

Instinct has taught the female to lay her eggs in damp situations, secure from heat or drought. Nor does her parental care stop here, as in most

other insects: when they are hatched, she broods over them, nearly in the same manner as a hen over her chickens, the little ones clinging to her sides for several hours in the day.

The usual food of the Earwig consists of decayed fruits and other vegetable substances; and it does not seem to be naturally carnivorous; though, if kept without proper nourishment, it will, like many other animals, occasionally attack, and devour even its own species.

For a long time it was supposed that the Earwig was always on the watch to enter the ears of people sleeping, causing intolerable pain, and sometimes even death; but this is now known to be a vulgar error, arising only from ignorance; the ear is already fitted with a substance which must prevent any insect from entering, even though the ear wax were away. There have been, indeed, a few instances of insects, and among the number, the earwig, taking shelter in the ears of people asleep, but they were easily expelled by dropping into it a small quantity of spirits, or sweet oil.

THE LOCUST.

THIS insect is about three inches long, and has two horns or feelers, an inch in length. The head and horns are of a brownish colour; it is blue about the mouth, as also on the inside of the larger legs. The shield that covers the back is greenish, and the upper sides of the body brown, spotted with black, and the under side purple. The upper wings are brown, with small dusky spots, with one larger at the tips; the under wings are more transparent, and of a light brown, tinctured with green, but there is a dark cloud of spots near the tips. There is no animal in the creation that multiplies so fast as these, if the sun be warm, and the soil in which their eggs are deposited, be dry. Happily for us, the coldness of our climate, and the humidity of our soil, are no way favourable to their production; nor have we been able to learn that Ireland has ever been afflicted with so destructive a visitant.

When the Locusts take the field, as we are assured, they have a leader at their head, whose flight they observe, and pay a strict attention to all his motions. They appear, at a distance, like a black cloud, which, as it approaches, gathers upon the horizon, and almost hides the light of day. It often happens that the husbandman sees

THE LOCUST.

this imminent calamity pass away without doing him any mischief; and the whole swarm pass onward, to settle upon the labours of some less fortunate country; but wretched is the district upon which they settle! They ravage the meadow and the pasture ground, strip the trees of their leaves, and the garden of its beauty; the visitation of a few minutes destroys the expectation of a year, and a famine but too frequently ensues.

Some of these prodigious swarms have been driven by high winds into rivers, where the offensive smell from their dead bodies has caused a plague. It would be impossible to conjecture where this calamity would cease, were it not that the benevolent Author of Nature has mixed mercy with his chastisements, and provided remedies for the evil. Sometimes they are destroyed by storms, at others carried to distant regions by violent winds, and generally accompanied by the locust-eater, a bird whose vast numbers seem proportioned to the insects, which, by the wise adjustment of Providence, they are appointed to feed on and destroy.

In their native tropical climate, they are not so dreadful as in the more southern parts of Europe. There, though the plain and the forest be stripped of their verdure, the power of vegetation is so great, that an interval of three or four days repairs the calamity; but our verdure is the livery of a season, and if once consumed by a swarm of these, we must wait till the ensuing spring

shall repair the damage. But it is not by what they devour that they do so much damage, as by what they destroy. To use the expression of the husbandman, they burn whatever they touch, and leave the marks of their devastation for two or three years ensuing.

What an insignificant being is proud man in the hands of his Creator! with whom a small insect is as powerful an instrument of destruction as the most terrific convulsions of nature. If he tends forth an army of Locusts, famine and pessilence follow in their train. The depredations of this formidable insect, in warm weather, are truly terrible. Nor has this visitation been confined to the other quarters of the globe; Europe has occasionally felt its effects; and in the year 1748, a swarm of locusts made their appearance in England, but, happily, the damps and chills of the climate thinned their numbers and checked their progress.

The swarm which visited England in 1748, was but a part of an immense army that made its appearance at the same time in Transylvania, Hungary, and Poland, and committed the most melancholy ravages. The following account was given by a person who was an eye-witness of their destructive progress:

"The first swarms entered Transylvania in August, 1748; these were succeeded by others, which were so surprisingly numerous, that when they reached the Red Tower, they were full four

hours in their passage over that place; and they flew so close, that they made a sort of noise in the air, by the beating of their wings against one another. The width of the swarm was some hundreds of fathoms, and its height or density may be easily imagined to be more considerable, inasmuch as they hid the sun, and darkened the sky, even to that degree, when they flew low, that people could not know one another at the distance of twenty paces; but, whereas they were to fly over a river that runs into the valleys of the Red Tower, and could find neither resting place nor food, being at length tired with their flight, one part of them alighted on the unripe corn on this side of the Red Tower, such as millet, Turkish wheat, &c. Another pitched on a low wood, where, having miserably wasted the produce of the land, they continued their journey, as if a signal had actually been given for a march. The guards of the Red Tower attempted to stop their irruption into Transylvania, by firing at them;* and indeed, where the balls and shot swept through the swarm, they gave way, and divided; but having filled up their ranks in a moment, they proceeded on their journey. In the month of September, some troops of them being thrown

* In the eastern parts of the world, it is often found necessary for the governors of particular provinces to command a certain number of the military to take the field against armies of locusts, with a train of artillery.

to the ground by great rains, and other inclemency of the weather, and, thoroughly soaked with wet, they crept along in quest of holes in the earth, dung, and straw; where, being sheltered from the rains, they laid a vast number of eggs, which stuck together by a gummy juice, and were longer and smaller than what is commonly called an ant's egg, very like grains of oats. The females having laid their eggs, died, like the silk-worm; and we Transylvanians found, by experience, that the swarms which entered our fields by the Red Tower, did not seem to intend remaining there, but were thrown to the ground by the force of the wind, and there laid their eggs; a vast number of which being turned up and crushed by the plough, in the beginning of the ensuing spring, yielded a yellowish juice.—In the spring of 1748, certain little blackish worms were seen lying in the fields, and among the bushes, sticking together, and collected in clusters, not unlike the hillocks of moles or ants. As nobody knew what they were, so there was little or no notice taken of them, and in May they were covered by the shooting of the corn sown in winter; but the subsequent June discovered what those worms were; for then, as the corn sown in spring was pretty high, these creatures began to spread over the fields, and became destructive to the vegetables by their numbers. Then, at length, the country people, who had slighted the warning given them, began to

repent of their negligence; for as these insects were now dispersed all over the fields, they could not be extirpated without injuring the corn. At that time they differed little or nothing from our common grasshopper, having their heads, sides, and back of a dark colour, with a yellow belly, and the rest of a reddish hue. About the middle of June, according as they were hatched sooner or later, they were generally a finger's length, or somewhat longer, but their shape and colour still continued. Towards the end of June, they cast off their outward covering, and then it plainly appeared they had wings, very like the wings of bees, but as yet unripe, and unexpanded; and then their body was very tender, and of a yellowish green; then, in order to render themselves fit for flying, they gradually enfolded their wings with their hinder feet, as flies do; and as soon as any of them found themselves able to use their wings, they soared up, and by flying round the others, enticed them to join them; and thus their numbers increased daily: they took circular flights of twenty or thirty yards square, until they were joined by the rest; and after miserably laying waste their native fields, they proceeded elsewhere in large troops. Wheresoever those troops happened to pitch, they spared no sort of vegetable; they eat up the young corn and the very grass; but nothing was more dismal than to behold the lands in which they were hatched;

for they so greedily devoured every thing green thereon, before they could fly, that they left the ground quite bare."

There is nothing to be feared in those places to which this plague does not reach before the autumn; for the Locusts have not strength to fly to any considerable distance, except in the months of July, August, and the beginning of September, and even then, in changing their places of residence, they seem to bend to warm climates.

What can have induced them to take such distant flights when they come into Europe, is not so easy to be accounted for. It seems most probable, that by means of a very dry season in the heart of Africa, they are propagated in such numbers, that the vegetables of the spot where they are produced are not sufficient to sustain them. Thus being obliged to find out other countries, they traverse the sandy deserts, where they can find no sustenance; still meeting with nothing to allure them from their height, they proceed forward across the sea, and thus come into Europe, where they alight upon the first green pastures that occur.

In some parts of the world the inhabitants turn what seems a plague, to their own advantage. Locusts are eaten by the natives in many kingdoms of the East; and are caught in small nets provided for the purpose. They parch them over the fire in an earthen pan, and when their

wings and legs are fallen off, they turn reddish, of the colour of boiled shrimps. Dampier has eat them, thus prepared, and thinks them a tolerable dish. The natives of Barbary also eat them fried with salt; and they are said to taste like cray-fish.

The Sacred Scriptures, which were written in a country where the locust made a distinguished feature in the picture of nature, have given us several very striking images of this animal's numbers and rapacity. They compare an army, where the numbers are almost infinite, to a swarm of Locusts: they describe them as rising out of the earth, where they are produced, and pursuing a settled march to destroy the fruits of the earth, and co-operate with divine indignation.

We shall conclude this description of the Locust with a short account of a flight which was recently seen in the East Indies.

"About the 20th of June, 1812, an immense swarm of Locusts was observed hovering about Etawah, a town in Hindostan, which at length settled in the fields east of that place, where they remained for some time; they then took their departure, but continued to hover about the place for a month afterwards. On the 18th July, an extraordinary swarm of very small dark-coloured insects was discovered in the vicinity of a pool of stagnant water; they were collected in heaps, and covered the ground to a consider-

able distance. These, on minute inspection, proved to be young locusts, whose wings were not yet grown. In this place they remained, hourly increasing in numbers, for some days, when the great body moved off in the direction of Etawah. They crept and hopped along at a slow rate, until they reached the town, where they divided into different bodies, still keeping nearly the same direction, covering and destroying every thing green in their progress, and distributing themselves all over the neighbourhood. The devastation daily committed by them, being almost incalculable, the farmers were under the necessity of collecting as many people as they could, in the vain hope that they might preserve the crop, by sweeping the swarm backwards: but as often as they succeeded in repelling them in one quarter, they approached them in another: fires were then lighted all around the fields, with the same view. This had the effect of keeping them off for a short time; but sufficient fuel could not be supplied, and the moment the fires became extinguished, the insects rushed in like a torrent: multitudes were destroyed by the birds, and many more by branches of trees, as well as by being swept into large heaps, and consumed by fire; yet their numbers seemed undiminished. So completely did they cover some mangoe trees, and the hedges surrounding the gardens, that the colour of the leaves could not be distinguished!

They had no wings, and were about the size of small bees. On the 27th, they had increased in size, and had overspread the country in every direction. From the want of rain, and the inroad of these insects, the hopes of the farmers were nearly at an end. Nothing impeded their progress; they climbed the highest trees, and scrambled over walls; and notwithstanding the exertions of several people with brooms, the balcony and outer walls of the hospital were completely covered with them. They no longer continued to move in one particular direction but paraded backward and forward wherever they could find food. On the 28th, the rains set in with considerable violence; the Locusts took shelter on trees and bushes, devouring every leaf within their reach; none seemed to suffer from the rain. On the 29th, it did not rain, and the young swarm were again on the move, continuing their depredations; they were fast increasing in size, and as lively as before the rain. On the 30th, their wings began to appear, and, on the day following, were an inch in length. It now began to rain, without ceasing, and a strong wind blowing at the same time, carried them to the southward, beyond observation; what became of them afterwards, is unknown; most probably they were driven before the gale into the sea, and perished."

THE GRASSHOPPER.

The Grasshopper is an animal so generally known, that a minute description of its form would be needless; it is of the colour of green leaves, except a line of brown which streaks the back, and two pale lines under the belly. It has four wings; the hinder of which are much finer, and more expansive than the foremost, and are the principal instruments of its flight.

A short time after the Grasshopper assumes its wings, it fills the meadow with its note; which, like that among birds, is a call to courtship. Towards the letter end of autumn, the female prepares to deposit her burden; and her body is then seen greatly distended with her eggs, which she carries, to the number of an hundred and fifty. In order to make a proper lodgment in the earth for them, Nature has furnished her with an instrument at her tail, somewhat resembling a two-edged sword, which she can sheathe and unsheath at pleasure: with this she pierces the earth as deep as she is able, and into the hole which this instrument has made, she deposits her eggs, one after the other.

Having thus provided for the continuation of posterity, the animal herself does not long

survive; but, as the winter approaches, she dries up, seems to feel the effect of age, and dies from a total decay. In the mean time, the eggs which have been deposited, continue unaltered, either by the severity of the season, or the retardation of the spring. At length, the sun, with its warmth, beginning to animate all nature, the insect feels its benign influence; and generally about the beginning of May, every egg produces an insect, about the size of a flea. These at first are of a whitish colour; at the end of two or three days they turn black; and soon after, they become of a reddish brown. They appear, from the beginning, like grasshoppers wanting wings, and hop among the grass, as soon as excluded, with great agility.

"The grasshopper, that, for above twenty days from its exclusion, has continued without the use of its wings, which were folded up to its body, at length prepares for its emancipation, and for a life of greater liberty and pleasure.—To make the proper dispositions for the approaching change, it ceases from its grassy food, and seeks about for a convenient place, beneath some thorn or thistle, that may protect it from an accidental shower. The same laborious writhings and workings, heavings and palpitations, which we have remarked in every other insect upon an approaching change, are exhibited in this. It swells up its head and neck; it then seems to draw them in again; and thus

alternately, for some time, it exerts its power to get free. At length, the skin, covering the head and breast, is seen dividing above the neck; the head is seen issuing out first from the bursting skin, and the efforts still continuing, the other parts follow successively: thus the little animal, with its long feelers, legs and all, works its way from the old skin, that remains fixed to the thistle or the thorn. It is, indeed, inconceivable how the insect can thus extricate itself from so exact a sheath as that which covered every part of its body.

The grasshopper, thus disengaged from its outer skin, appears in its perfect form; but then so feeble, and its body so soft and tender, that it may be moulded like wax. It is no longer of that obscure colour which it exhibited before, but a greenish white, which becomes more vivid as the moisture on the surface is dried away. Still, however, the animal continues to shew no signs of life, but appears quite spent and fatigued with its labour, for more than an hour together. During this time, the body is drying, and the wings unfolding to their greatest expansion, and the curious observer will perceive them, fold after fold, opening to the sun, till at last they become longer than the two hinder legs. The insect's body also is lengthened during this operation, and it becomes much more beautiful than before.

TO THE GRASSHOPPER.

1

Happy Insect! blithe and gay,
Seated on the sunny spray,
And drunk with dew, the leaves among,
Singing sweet thy chirping song.

2

All the various season's treasures,
All the products of the plains,
Thus lie open to thy pleasures,
Fav'rite of the rural swains.

3

Thy cheerful note in wood and vale
Fills every heart with glee;
And summer smiles in double charm,
While thus proclaim'd by thee.

THE CRICKET.

The Cricket very much resembles the Grasshopper in its shape, voice, and habits; it differs in its colour, which is uniformly of a rusty

brown: in its food, which is more various; and in its place of residence, which is most usually in the warmest chinks behind a country hearth. They are, in some measure, obliged to the bad masonry employed in making peasants' houses for their retreats. The smallest chink serves to give them shelter; and where they once make their abode, they are sure to propagate. They are of a most chilly nature, seldom leaving the fire-side; and, if undisturbed, are seen to hop from their retreats, to chirp at the blaze in the chimney. The wood-cricket is the most timorous animal in nature; but the chimney-cricket, being used to noises, disregards not only those, but the appearance of people near it.

As the cricket lives chiefly in the dark, so its eyes seem formed for the gloominess of its abode; and those who would surprize it, have only to light a candle unexpectedly; by which it is dazzled, and cannot find the way back to its retreat. It is a very voracious little animal, and will eat bread, flour, and meat. They never drink, but keep for months together at the back of the chimney, where they could not possibly have had any moisture. The warmth of their situation only serves to encrease their mirth and loquacity. Except in the very coldest weather, they never cease their chirping, but continue that little piercing note, so pleasing to some ears.

THE CRICKET.

1

Little inmate, full of mirth,
Chirping on my kitchen hearth;
Wheresoe'er be thine abode,
Always harbinger of good.
Pay me for thy warm retreat
With a song more soft and sweet;
In return thou shalt receive
Such a strain as I can give.

2

Thus thy praise shall be exprest,
Inoffensive, welcome guest!
While the rat is on the scout,
And the mouse with curious snout,
With what vermin else infest
Every dish, and spoil the best;
Frisking thus before the fire,
Thou hast all thine heart's desire.

3

Though in voice and shape they be
Formed as if akin to thee,
Thou surpassest, happier far,
Happiest Grasshoppers that are;

Their's is but a Summer's song,
Thine endures the Winter long,
Unimpair'd, and shrill, and clear,
Melody throughout the year.

4

Neither night, nor dawn of day,
Puts a period to thy play:
Sing then—and extend thy span
Far beyond the date of man.
Wretched man, whose years are spent,
In repining discontent,
Lives not, aged though he be,
Half a span, compared with thee.

But of all the Cricket kind, that which is called the Mole-Cricket, is the most extraordinary. This animal is the largest of all the insects with which we are acquainted in this country, being two inches and a half in length, and three quarters of an inch in breadth. Its general appearance is the same as that of the Grasshopper. We shall remark, however, one peculiarity in the animal, which fits it admirably for the life it is to lead; the fore-feet, which are its principal instruments of burrowing into the earth, are strong, webbed, and hairy: it generally, however, runs backward; but it is commonly under ground, where it burrows even

faster than a mole. It is thought also to be amphibious, and capable of living under water, as well as under ground.

Of all insects this is the most detested by gardeners, as it chiefly resides in that ground which lies light, and where it finds sufficient plenty under the surface. Thus, in a single night's time, it will run along a furrow which has been newly sown, and rob it of all its contents. Its legs are formed in such a manner, that it can penetrate the earth in every direction; before, behind, and above it. At night, it ventures from its underground habitation, and, like the Cricket, has its chirping call. The female makes a cell of clammy earth, the inside of which is large enough to hold two hazel-nuts; and in this she lays her eggs. The whole nest is about the size of a common hen's egg, closed up on every side, and well defended from the smallest breath of air. The eggs generally amount to the number of an hundred and fifty, being white, and about the size of a caraway comfit. They are thus carefully covered, as well to defend them from the injuries of the weather, as from the attacks of the black-beetle; which, being itself an underground inhabitant, would, but for this precaution, devour or destroy them. To prevent this, the female Mole-Cricket is often posted as a centinel near the nest, and when the black invader plunges in to seize its prey, the guardian

insect seizes him behind, and instantly bites him in two.

Nothing can exceed the care and assiduity which these animals exhibit in the preservation of their young. Wherever the nest is placed, there is a ditch drawn about it, which few of its insect enemies are able to pass. But their care is not confined to this only; for, at the approach of winter, they carry their nest entirely away, and sink it deeper in the ground, so that the frost can have no influence in retarding the young brood from coming to maturity. As the weather grows milder, they raise their magazine in proportion; till, at last, they bring it as near the surface as they can, to receive the genial influence of the sun, without wholly exposing it to view; yet, should the frost unexpectedly return, they sink it again as before.

THE PERUVIAN LANTERN FLY.

The Lantern Fly is undoubtedly one of the most curious insects. It is of a very considerable size, measuring nearly three inches and a half from wing's end to wing's end, when expanded. This beautiful insect is a native of Surinam, and many other parts of South Ame-

rica, and during the night diffuses so strong a phosphoric splendour from its head, or lantern, that it may be employed for the purpose of a candle or torch; and it is said, that three or four of the insects, tied to the top of a stick, are frequently used by travellers for that purpose. The celebrated Madame Merian, in her work on the insects of Surinam, gives a very agreeable account of the surprise into which she was thrown by the first view of the flashes of light proceeding from these insects. "The Indians once brought me," says she, "before I knew that they shone by night, a number of these Lantern Flies, which I shut up in a large wooden box. In the night they made such a noise, that I awoke in a fright, and ordered a light to be brought, not knowing from whence the noise proceeded. As we found that it came from the box, we opened it, but were still much more alarmed, and let it fall to the ground in a fright, at seeing a flame of fire come out of it; and as many animals as came out, so many flames of fire appeared. When we found this to be the case, we recovered from our fright, and again collected the insects, highly admiring their splendid appearance."

THE COCHINEAL.

This insect is celebrated for the beauty of the colour which it yields, when properly prepared. It is a native of South America, and is peculiarly cultivated in the country of Mexico. The female Cochineal insect, in its full-grown, pregnant, or torpid state, swells or grows to such a size, in proportion to its former magnitude, that the legs, antennæ, and proboscis, become almost imperceptible without the assistance of a glass; so that on a general view, it bears as great a resemblance to a seed, or a berry, as to an animal. This was the cause of that difference in opinion, which long subsisted between several authors; some maintaining that Cochineal was a berry, while others contended that it was an insect.

When the female Cochineal insect is arrived at its full size, it fixes itself to the surface of the leaf, and envelopes itself in a white, cottony matter, which it is supposed to spin or draw through its proboscis in a continued double filament; it being observed, that two filaments are frequently seen proceeding from the tip of the proboscis in the full-grown insects.

The male is a small and rather slender fly, about the size of a flea, with jointed antennæ, and large white wings in proportion to the body, which is of a red colour, with two long

filaments proceeding from the tail. It is an active and lively animal, and is dispersed in small numbers among the females, in the proportion of about one male to a hundred and fifty, or even two hundred females. When the female insect has discharged all its eggs, it becomes a mere husk, and dies; so that the proprietors are very careful to kill the insects before that time, lest they should be disappointed of the beautiful colour. These insects, when picked or brushed off the plants, are killed either by the fumes of heated vinegar, or by smoke, and then dried, in which state they are imported into Europe: and it is said, that the Spanish government is annually more enriched by the profit of the Cochineal trade, than by the produce of all its gold mines.

It may be necessary to add, that exclusive of the general, or large scale, in which Cochineal is used by the dyers, the fine colour, so much esteemed in painting, and known by the name of carmine, is no other than a preparation from the same substance, and is unquestionably the most beautiful of all the reds.

THE CUCKOO-SPIT.

THE Cuckoo-Spit insect is so named from the circumstance of its producing, during its immature state, the white froth so common on various plants in the Summer season, and popularly known by the name of Cuckoo-spittle. During this, its immature state, the animal continues to suck with its proboscis the juice of the plant on which it resides, discharging it at intervals from the hind part of its body, in the form of very minute glutinous bubbles, and by continuing this operation, completely covers itself under a large mass of the white froth. When arrived at its full growth, it measures about the fifth of an inch in length, and is of a beautiful pale green colour; it now casts its skin, and appears in its perfect state, when the wings (of which the rudiments only were apparent before) are very conspicuous: the whole insect is now of a pale brown colour, with a pair of pale or whitish bands across the wings. In this state it is often called by the name of the frog-hopper, from a fancied resemblance to the shape of that animal, in miniature. These insects breed in the month of September, and deposit their eggs towards the beginning of October, which, however, do not hatch till the following spring.

THE CATERPILLAR.

If we take a cursory view of insects in general, Caterpillars alone, and the butterflies and moths they give birth to, will make a third part of the number. Wherever we move, wherever we turn, these insects, in one shape or another, present themselves to our view. Some, in every state, offer the most entertaining spectacle; while others are beautiful only in their winged form.

There is no insect so beautiful, or splendid, as the Butterfly. But we are still more strongly attached to this tribe, from the usefulness of one of the number The silkworm is, perhaps, the most serviceable of all other animals; since, from its labours, and the manufacture attending it, many thousands in the civilized world are clothed, adorned, or supported.

Caterpillars may be easily distinguished from worms, or maggots, by the number of their feet; and by their producing butterflies or moths. They have feet both before and behind; which not only enable them to move forward by a sort of steps made by their fore and hinder parts, but also to climb up vegetables, and to stretch themselves out from the boughs and stalks, to reach their food at a distance. All of this class have from eight feet, at the least, to sixteen; and this may

serve to distinguish them from the worm tribe, that never have so many. The animal into which they are converted, is always a butterfly or a moth; and these are always distinguished from other flies, by having their wings covered over with a painted dust, which gives them such various beauty. The wings of flies are transparent, as we see in the common flesh fly; while those of beetles are hard, like horn: and from such, the wing of a butterfly may be easily distinguished.

The changes they undergo, are also more numerous than those of an insect. When the animal, in the catterpillar state, has come to a certain magnitude, it discontinues eating, makes itself a covering or husk, in which it remains wrapped up, seemingly without life or motion; and after having for some time continued in this state, it once more bursts its confinement, and comes forth a beautiful butterfly. Thus, we see this animal, put on no less than three different appearances, from the time it is first excluded from the egg. It appears a crawling caterpillar; then an insensible aurelia, as it is called, without life or motion; and lastly, a butterfly, variously painted, according to its different kind.

Changes so extraordinary, however, and so well calculated to excite our admiration, require a more particular description.

When winter has stripped the trees of their leaves, Nature then seems to have lost her insects. There are thousands of different kinds, with and without wings, which, though swarming at other seasons, then entirely disappear. Our fields are re-peopled, when the leaves begin to bud, by the genial influence of spring; and caterpillars, of various sorts, are seen feeding upon the promise of the year, even before the leaves are completely unfolded. All these animals are hatched from the eggs of butterflies; and those who observe them closely, will find the fly very careful in depositing its eggs in places where they are likely to be hatched with the greatest safety and success. During winter, therefore, the greatest number of caterpillars are in an egg state; and in this lifeless situation, brave all the rigours and the humidity of the climate; and though often exposed to all its changes, still preserve the latent principle of life, which is more fully exerted at the approach of spring. That same power that pushes forth the budding leaf, and the opening flower, impels the insect into animation; and Nature, at the same time, calls the animal into life, and provides for its support.

Whilst these caterpillars are sent off from the egg in the beginning of spring, others in a more advanced stage of their existence, have subsisted during winter in their aurelia state: in which, as we have briefly observed above, the animal is seemingly deprived of life and

motion. In this state of insensibility they continue during the rigours of winter; some enclosed in a kind of shell, which they have spun for themselves at the end of autumn; some concealed under the bark of trees; others in the chinks of old walls; and many buried under ground. From all these, a variety of butterflies are seen to issue, in the spring; and adorn the earlier part of the year with their painted flutterings.

In general, however, whether the animal has subsisted in an egg state, during the winter, or as a butterfly, that lays its eggs as soon as the leaves of the plants are shot forward, the whole swarm of caterpillars are in motion to share the banquet that Nature has provided. There is scarcely a plant that has not its own peculiar insects; and some are known to support several of different kinds. Of these, many are hatched from the egg, at the foot of the tree, and climb up to its leaves for subsistence: the eggs of others have been glued by the parent butterfly to the leaves; and they are no sooner excluded from the shell, but they find themselves in the midst of plenty.

When the caterpillar first bursts from the egg, it is small and feeble; its appetites are in proportion to its size, and it seems to make no great consumption: but as it encreases in magnitude, it improves in its appetites: so that in its adult caterpillar state, it is the most raven-

ous of all animals whatsoever. A single caterpillar will eat double its own weight of leaves in a day, and yet seem no way disordered by his meal. What would mankind do, if their oxen or their horses were so voracious?

The life of a caterpillar seems one continued succession of changes; and it is seen to throw off one skin only to assume another; which also is divested in its turn: and thus, for eight or ten times successively. We must not, however, confound this changing of the skin with the great change which it is afterwards to undergo. The throwing off one skin, and assuming another, seems, in comparison, but a slight operation among these animals: this is but the work of a day; the other is the great adventure of their lives. Indeed, this faculty of changing the skin, is not peculiar to caterpillars only, but is common to all the insect kind; and even to some animals that claim a higher rank in nature. The lobster and the crab, for instance, out-grow their first shells, and then burst from their confinement, in order to assume a covering more roomy and convenient. It is probable that the louse, the flea, and the spider, change their covering from the same necessity; and growing too large for the crust in which they have been for some time enclosed, burst it for another. With respect to caterpillars, many of them change their skins five or six times in a season; and this covering, when cast off, often seems so complete, that

many might mistake the empty skin for the real insect. Among the hairy caterpillars, for instance, the cast skin is covered with hair; the feet remain fixed to it; even the parts which nothing but a microscope can discover, are visible in it; in short, all the parts of the head, not only the skull, but the teeth.

In proportion as the time approaches in which the caterpillar is to cast its old skin, its colour becomes more feeble, the skin seems to wither and grow dry, and in some measure resembles a leaf, when it is no longer supplied with moisture from the stock. At that time, the insect begins to find itself under the necessity of a change; and it is not effected without violent labour, and perhaps pain. A day or two before the critical hour approaches, the insect ceases to eat, and seems to rest immoveable. It seeks some place to remain in security; and no longer timorous, seems regardless even of the touch. It is now and then seen to bend itself, and elevate its back; again it stretches to its utmost extent: it sometimes lifts up the head, and then lets it fall again; it sometimes waves it three or four times from side to side, and then remains in quiet. At length, some of the rings of its body, particularly the first and second, are seen to swell considerably; the old skin distends and bursts, till, by repeated swellings and contractions in every ring, the animal disengages itself, and creeps from its inconvenient covering.

The caterpillar having in this manner continued for several days feeding, and at intervals casting its skin, begins at last to prepare for its change into an aurelia. For this purpose, some spin themselves a cone or web, in which they lie secure till they have arrived at maturity: others, that cannot spin so copious a covering, suspend themselves by the tail, in some retreat where they are not likely to meet disturbances. Some mix sand with their gummy and moist webs, and thus make themselves a secure incrustation; while others, before their change, bury themselves in the ground, and thus avoid the numerous dangers that might attend them. One would imagine that they were conscious of the precise time of their continuance in their aurelia state, since their little sepulchres, with respect to the solidity of the building, are proportioned to such duration. Those that are to lie in that state of existence but a few days, make choice of some tender leaf, which they render still more pliant by diffusing a kind of glue upon it: the leaf thus gradually curls up, and withering as it enfolds, the insect wraps itself within, as in a mantle, till the genial warmth of the sun enables it to struggle for new life, and burst from its confinement. Others, whose time of transformation is also near at hand, fasten their tails to a tree, or to the first worm-hole they meet in a beam, and wait in that defenceless situation. Such caterpillars, on the other hand, as are seen to lie

several months in their aurelia state, act with much greater circumspection. Most of them mix their web with sand, and thus make themselves a strong covering: others build in wood, which serves them in the nature of a coffin. Such as have made the leaves of willows their favourite food, break the tender twigs of them first into small pieces, then pound them, as it were, to powder: and, by means of their glutinous silk, make a kind of paste, in which they wrap themselves up. Many are the forms which these animals assume in this helpless state; and it often happens, that the most deformed butterflies issue from the most beautiful aurelias.

The butterfly, however, does not continue so long under the form of an aurelia, as one would be apt to imagine. In general, those caterpillars that provide themselves with cones, continue within them but a few days after the cone is completely finished. Some, however, remain buried in this artificial covering for eight or nine months, without taking the smallest sustenance during the whole time: and though in the caterpillar state no animals were so voracious, when thus transformed, they appear a miracle of abstinence. In all, sooner or later, the butterfly bursts from its prison; not only that natural prison which is formed by the skin of the Aurelia, but also from that artificial one of silk, or any other substance in which it has enclosed itself.

The efforts which the butterfly makes to get free from its aurelia state, are by no means so violent as those which the insect had in changing from the caterpillar into the aurelia. The quantity of moisture surrounding the butterfly, is by no means so great as that attending its former change; and the shell of the aurelia is so dry, that it may be cracked between the fingers.

If the animal be shut up within a cone, the butterfly always gets rid of the natural internal skin of the aurelia, before it eats its way through the external covering which its own industry has formed round it. In order to observe the manner in which it thus gets rid of the aurelia covering, we must cut open the cone, and then we shall have an opportunity of discovering the insect's efforts to emancipate itself from its natural shell. When this operation begins, there seems to be a violent agitation in the humours contained within the little animal's body. Its fluids seem driven with great rapidity, through all the vessels; while it labours violently with its legs, and makes several other violent struggles to get free. As all these motions concur with the growth of the insect's wings and body, it is impossible that the brittle skin which covers it, should longer resist: it at length gives way, by bursting into four distinct regular pieces. The skin of the head and legs first separates; then the skin at the back flies open, and dividing into

two regular portions, disengages the back and wings: then there likewise happens another rupture in that portion which covered the rings of the back of the aurelia. After this, the butterfly, as if fatigued with its struggles, remains very quiet for some time, with its wings pointed downwards, and its legs fixed in the skin which it had just thrown off. At first sight the animal, just set free, and permitted the future use of its wings, seems to want them entirely: they take up such little room, that one would wonder where they were hidden. But soon after, they expand so rapidly, that the eye can scarce attend their unfolding. From reaching scarcely half the length of the body, they acquire, in a most wonderful manner, their full extent and bigness, so as to be each five times larger than they were before. Nor is it the wings alone that are thus encreased; all their spots and paintings, before so minute as to be scarce discernable, are proportionably extended; so that, what a few minutes before seemed only a number of confused, unmeaning points, now become distinct and most beautiful ornaments. Nor are the wings, when they are thus expanded, unfolded in the manner in which earwigs and grasshoppers display theirs, who unfurl them like a lady's fan: on the contrary, those of butterflies actually grow to their natural size in this very short space. The wing, at the instant it is freed from its late confinement, is considerably

thicker than afterwards: so that it spreads in all its dimensions, growing thinner as it becomes broader. As the wings extend themselves so suddenly, they have not yet had time to dry; and accordingly appear like pieces of wet paper, soft, and full of wrinkles. In about half an hour they are perfectly dry, their wrinkles entirely disappear, and the little animal assumes all its splendour. The transmutation being thus perfectly finished, the butterfly discharges three or four drops of a blood-coloured liquid, which are the last remains of its superfluous moisture. Those aurelias which are enclosed within a cone, find their exit still more difficult, as they still have another prison to break through: this, however, they perform in a short time; for the butterfly, freed from its aurelia skin, butts with its head violently against the walls of its artificial prison, and probably with its eyes, that are rough and like a file, it rubs the internal surface away; till it is at last seen bursting its way into light; and, in less than a quarter of an hour, the animal acquires its full perfection.

The wings of Butterflies fully distinguish them from flies of every other kind. They are four in number; and though two of them were separated from the body by any accident, the animal can fly with the two others remaining.

Nothing can exceed the beautiful and regular arrangement of those little substances, which serve to paint the butterfly's wing.

Their wings, all glorious to behold,
Bedropt with azure, jet, and gold,
Wide they display: the spangled dew
Reflects their eyes and various hue.

But leaving the other parts of the Butterfly, let us turn our attention particularly to the head. The eyes of Butterflies have not all the same form; for, in some they are large, in others small; in some they are the larger portion of a sphere, in others they are but a small part of it, and just appearing from the head. In all of them, however, the outward coat has a lustre, in which may be discovered the various colours of the rainbow. When examined a little closely, it will be found to have the appearance of a multiplying glass; having a great number of sides, or facets, in the manner of a brilliant cut diamond. In this particular, the eye of the Butterfly, and of most other insects, entirely correspond; and Leuenhock has found, that there are above six thousand facets on the cornea of a flea. These animals, therefore, see not only with great clearness, but view every object multiplied in a surprising manner. Puget adapted the cornea of a fly in such a position, as to see objects through it by the means of a microscope; and nothing could exceed the strangeness of its representations; a soldier, who was seen through it, appeared like an army of pigmies; for, while it multiplied, it also diminished the object. The arch of a bridge

exhibited a spectacle more magnificent than human skill could produce; the flame of a candle seemed a beautiful illumination. It still, however, remains a doubt, whether the insect sees objects singly, as with one eye; or, whether every facet is itself a complete eye, exhibiting its own object distinct from all the rest.

Butterflies, as well as most other flying insects, have two instruments, like horns on their heads, which are commonly called feelers. They differ from the horns of greater animals, in being moveable at their base; and in having a great number of joints, by which means the insect is enabled to turn them in every direction. Those of Butterflies are placed at the top of the head, pretty near the external edge of each eye. What the use of these instruments may be, which are thus formed with so much art, and by an Almighty and wise Creator, who does nothing without reason, is as yet unknown to man.

We are not so ignorant of the uses of the trunk, which few insects of the Butterfly kind are without. This instrument is placed exactly between the eyes; and when the animal is not employed in seeking its nourishment, it is rolled up like a curl. A Butterfly, when it is feeding, flies round some flower, and settles upon it. The trunk is then uncurled, and thrust out either wholly or in part; and is employed in searching the flower to its very bottom, let it be ever so deep. This search being repeated seven

or eight times, the Butterfly then passes to another; and continues to hover over those agreeable to its taste, like a bird over its prey. This trunk consists of two equal hollow tubes, nicely joined to each other, like the pipes of an organ.

Such is the figure and conformation of these beautiful insects, that cheer our walks, and give us the earliest intimations of Summer. But it is not by day alone that they are seen fluttering wantonly from flower to flower, as the greatest number of them fly by night, and expand the most beautiful colouring, at those hours when there is no spectator. This tribe of insects has therefore been divided into Diurnal and Nocturnal Flies; or, more properly speaking, into Butterflies and Moths; the one only flying by day, the other most usually being on the wing in the night. They may be easily distinguished from each other, by their horns or feelers; those of the Butterfly being clubbed, or knobbed at the end; those of the Moth, tapering finer and finer to a point.

The Butterflies, as well as the Moths, employ the short life assigned them, in a variety of enjoyments. Their whole time is spent either in quest of food, which every flower offers; or in preparing to continue their race. Their sagacity in discovering each other, though at two miles distance, is astonishing, since it is difficult to ascertain by what sense they are directed. The fact, however, is certain, that the male, after

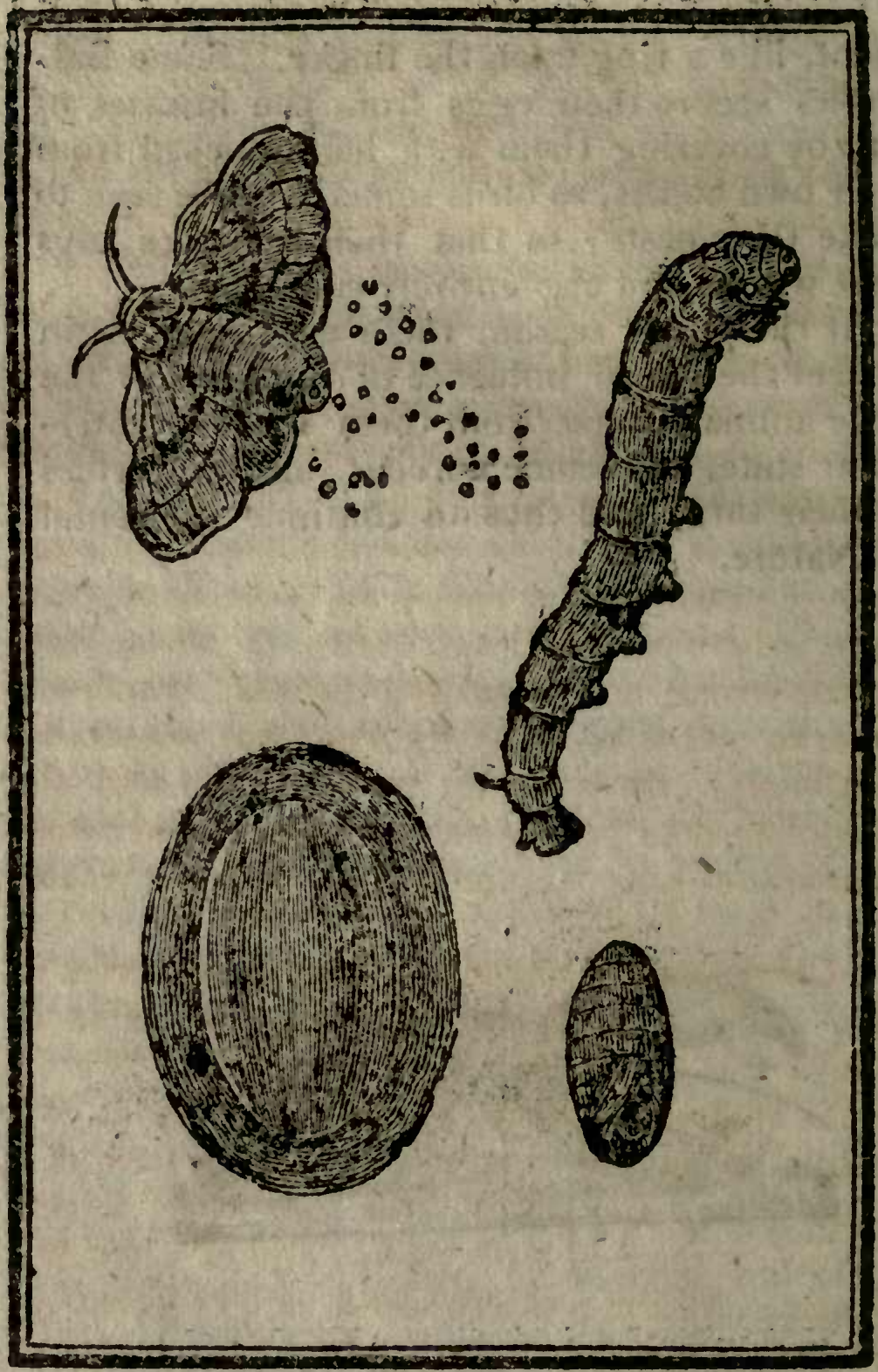
having fluttered, as if carelessly about for some time, is seen to take wing and go forward, sometimes for two miles together, in a direct line, to where the female is perched on a flower.

But the females of many Moths and Butterflies seem to have assumed their airy form for no other reason but to fecundate their eggs, and lay them. They seem also very well instructed by Nature in the choice of the plant, or the leaf, where they shall deposit their burden. Each egg contains but one caterpillar; and it is requisite that this little animal, when excluded, should be near its peculiar provision. The Butterfly, therefore, is careful to place her brood only upon those plants that afford good nourishment to its posterity. Though the little winged animal has been fed upon dew, or the honey of flowers, yet it makes choice for its young of a very different provision, and lays its eggs on the most unsavoury plants; the ragweed, the cabbage, or the nettle. Thus, every Butterfly chuses not the plant most grateful to it in its winged state; but such as it has fed upon in its reptile form.

All the eggs of Butterflies are attached to the leaves of the favourite plant, by a sort of size or glue; where they continue, unobserved, unless carefully sought after. The eggs are sometimes placed round the tender shoots of plants, in the form of bracelets, consisting of above two hundred in each, and generally surrounding the

shoot, like a ring upon the finger. Some Butterflies secure their eggs from the injuries of air, by covering them with hair plucked from their own bodies, as birds sometimes are seen to make their nests; so that their eggs are thus kept warm, and also entirely concealed.

At the proper season, these eggs soon begin to feel the genial influence of the season; the little animals burst from them in their caterpillar state, to become aureiias, and Butterflies in their turn, and thus to continue the round of Nature.



A BUTTERFLY, A CATERPILLAR, A COCOON, A CHRYSALIS.

THE SILK-WORM.

We shall now mention an animal of the Moth kind, which amply compensates for all the mischief done by the caterpillar. The Silk-Worm has been made of the utmost service to man, and furnishes him with a most beautiful covering.

The Silk-Worm is a large caterpillar, of a whitish colour, with twelve feet, and produces a Butterfly of the moth kind. The cone which it spins, is formed for covering it while it continues in the aurelia state; and several of these properly wound off, and united together, form those strong and beautiful threads, which are woven into silk. The feeding these worms, the gathering, the winding, the twisting, and the weaving their silk, is one of the principal manufactures of Europe; and a great source of wealth to the industrious.

China, one of the oldest peopled countries in the globe, appears to have been the first to make use of the web spun by the Silk-Worm. This creature, which, in its perfect state, is a moth, is hatched from the egg in the form of a caterpillar, and passes from that state successively to these of a chrysalis, and of a winged insect. While a caterpillar it eats voraciously, its proper and favourite food being the leaves of the mulberry tree. By this diet, it is enabled to lay up within its body, a kind of transparent

glue, which has the property of hardening as soon as it comes into the air. When arrived at full maturity, it spins itself a web, out of this gluey matter; within which it is to lie safe and concealed during its change into the helpless state of a chrysalis.

The Silk-Worm's web is an oval ball, called a cocoon, about the size of a pigeon's egg, of a hue varying from light straw to full yellow, or white, and consisting of a single thread, wound round and round, so as to make a covering of the closest texture. In this it encloses itself, and would, if undisturbed, come forth, in fifteen days, a perfect moth. This, however, is prevented when the animal is reared for the sake of its silk, as the moth would, in breaking its way through the web, destroy the silk. The balls are, therefore, exposed to such a heat as to kill the chrysalis, a few only being saved for the breed of the following year.

The moth, when hatched, is a very short lived animal, and seems produced for the sole purpose of continuing its kind. The caterpillar has never been taught by a parent, since it is not hatched from the egg till many months after all the parent moths are dead. Nor can it discern the use of spinning itself a web in which it is to be prepared for a new and untried state of being. It obeys, therefore, an impulse implanted in it by the Almighty; guided by this unerring principle, it reaches its last and most perfect

form, and having laid its eggs, and finished the purpose of its existence,—dies.

The length of the Silk-worm's thread, when unravelled, varies in different silk balls. Denham informs us, that a lady of his acquaintance, who took much pleasure in rearing Silk-Worms, had once the curiosity to draw out and measure the whole of one, and found it to be considerably more than 300 yards, though the weight was only two grains and a half.

1

Poor insect! what a little day
Of sunny bliss is thine;
And yet thou spread'st thy light wings gay,
And bid'st them spreading shine.

2

Thou humm'st thy short and busy tune,
Unmindful of the blast;
And careless, while 'tis burning noon,
How soon that noon be past.

3

Then spread thy little shining wing,
Hum on thy busy lay;
For *Man*, like thee, has but his spring,
Like thine it fades away.

THE ICHNEUMON FLY.

This Fly receives its name from the little quadruped, which is found to be so destructive to the crocodile, as it bears a strong similitude in its courage and rapacity.

Though there are many different kinds of this insect, yet the most formidable, and that best known, is called the common Ichneumon, with four wings, like the bee, a long, slender black body, and a three forked tail, consisting of bristles; the two outermost black, and the middlemost red.

Though this instrument, like a tail, is, to all appearance, slender and feeble, yet it is found to be a weapon of great force and efficacy.—There is scarcely any substance which it will not pierce; and, indeed, it is seldom seen but employed in penetration. This is the weapon of defence; this is employed in destroying its prey; and still more, by this the animal deposits her eggs wherever she thinks fit to lay them. As it is an instrument chiefly intended and employed for this latter purpose, the male is unprovided with such a sting, while the female uses it with great force and dexterity, brandishing it, when caught, from side to side, and very often wounding those who thought they held her with the greatest security.

All the flies of this tribe are produced in the same manner, and owe their birth to the destruction of some other insect, within whose body they have been deposited, and on whose vitals they have preyed, till they came to maturity. There is no insect whatever, which they will not attack, in order to leave their fatal present in its body; the caterpillar, the gnat, and even the spider himself, so formidable to others, is often made the unwilling fosterer of this destructive progeny.

About the middle of Summer, when other insects are found in great abundance, the Ichneumon is seen flying busily about, and seeking proper objects upon whom to deposit its progeny. As there are various kinds of this fly, so they seem to have various appetites. Some are found to place their eggs within the aurelia of some nascent insect, others place them within the nest which the wasp had curiously contrived for its own young; and as both are produced at the same time, the young of the ichneumon, not only devours the young wasp, but the whole supply of worms, which the parent had carefully provided for its support. But the greatest number of the ichneumon tribe are seen settling upon the back of the caterpillar, and darting, at different intervals, their stings into its body. At every dart, they depose an egg, while the wounded animal seems scarcely sensible of the injury it sustains. In this manner they leave from six to a dozen

of their eggs, within the fat substance of the reptile's body, and then fly off to commit further depredations. In the mean time the caterpillar thus irreparably injured, feeds as voraciously as before, and to all appearance, seems no way affected by the internal enemies that are preparing its destruction. But they soon burst from their egg state, and begin to prey upon the substance of their prison. As they grow larger, they require a greater supply, till at last the animal, by whose vitals they are supported, is no longer able to sustain them, but dies; its whole inside being almost eaten away. It often happens, however, that it survives their worm state, and creeps into some corner in order to undergo its own change into a chrysalis: you will then perceive a number of small maggots emerging from its body, and proceeding immediately to envelope themselves in distinct yellow cases, forming one group round the caterpillar. The caterpillar, however, is irreparably destroyed, it never changes into a chrysalis, but dies shortly after, from the injuries it had sustained.

Such is the history of this fly, which, though very terrible to the insect tribe, fails not to be of infinite service to mankind. The millions which it kills in a single summer, are inconceivable; thus preventing the excessive multiplication of a race which, without such checks, would destroy all the fruits of the earth.

THE LIBELLA, OR DRAGON-FLY.

OF all the flies that adorn or diversify the face of Nature, these are the most various and the most beautiful; they are of all colours; green, blue, crimson, scarlet, white; some unite a variety of the most vivid tints, and exhibit in one animal, more different shades than are to be found in the rainbow.

They are distinguished from all other flies by the length of their bodies, by the largeness of their eyes, and the beautiful transparency of their wings, which are four in number. They are seen in Summer, flying with great rapidity near every hedge, and by every running brook; they sometimes settle on the leaves of plants, and sometimes keep for hours together on the wing.

The largest sort are generally found from two to three inches long; their tail is forked; their body divided into eleven rings; their eyes are large, horny, and transparent, divided by a number of intersections; and their wings, that always lie flat when they are at rest, are of a beautiful glossy transparency; sometimes shining like silver, and sometimes glistening like gold. Within the mouth are to be seen two teeth covered with a beautiful lip; with these the creatures bite fiercely when they are taken; but their bite is perfectly harmless.

These insects, beautiful as they are, are produced from eggs, which are deposited in the water, where they remain for some time without seeming life or motion. The form in which they first shew life, is that of a worm with legs, bearing a strong resemblance to the dragon-fly in its winged state, except that the wings are yet concealed within a sheath peculiar to this animal. The rudiments of these appear in bunches on the back, within which the wings are folded up into each other, while all the colours and varieties of painting appear transparent through the skin. These animals, upon quitting the egg, still continue in the water, where they creep and swim, but do not move swiftly. They have likewise a sharp sight, and immediately sink to the bottom, if any one comes to the place wherein they live, or whenever they perceive the least uncommon object. They are exceedingly voracious, and commit great havoc among the smaller water insects in general.

When these animals prepare to change from their reptile to their flying state, they creep up the stem of some water-plant, by which means they rise above the surface of the water. They there firmly fix their sharp claws; and, for a short time, continue quite immoveable, as if meditating on the change they are to undergo. It is then observed, that the skin first opens on the head and back; and out of this opening, they exhibit their real head and eyes, and at length

their six legs; whilst, in the mean time, the hollow or empty skin, or slough of their legs, remains firmly fixed in its place. After this, the enclosed creature creeps forward by degrees, and by this means draws first its wings and then its body out of the skin; and proceeding a little farther, sits at rest for some time, as if immoveable. During this time, the wings, which were moist and folded, begin by degrees to expand themselves, and to make smooth and even, all those plaits which were laid against each other, like a closed fan. The body is likewise insensibly extended, until all the limbs have obtained their proper size and dimensions. The creature cannot at first make use of its new wings, and therefore is forced to stay in the same place until all its limbs are dried by the air. It soon, however, begins to enter upon a more noble life than it had hitherto led in the bottom of the brook; and from creeping slowly and living accidentally, it now wings the air, and makes choice from amidst the variety of its provisions.

It is impossible not to be struck with admiration at the changes of this insect into such opposite states; while an inhabitant of the water, it would perish by any long exposure to the air, but now that it is become a winged animal, it would as effectually be destroyed by that element which, not an hour before, was natural to it.

Indeed, no animal is more amply fitted for motion, subsistence and enjoyment. As it haunts

and seeks after its food flying in the air, Nature has provided it with two large eyes, which make almost the whole head, and which resemble glittering mother of pearl. It has also four expansive silver-coloured wings, with which, as with oars, it can turn itself with prodigious velocity; and to assist these, it is furnished with a very long body, which, like a rudder, directs its motions. As the wings are long and the legs short, they seldom walk, but are ever seen either resting or flying. For this reason, they always chuse dry brauches of trees or shrubs to remain on; and when they have refreshed themselves a little, they renew their flight. Thus they are seen adorning the Summer with a profusion of beauty, lightly traversing the air in a thousand directions, and expanding the most beautiful colours to the sun. The garden, the forest, the hedges, and the rivulets, are animated by their sports: and there are few who have been brought up in the country, who have not employed a part of their childhood in observing them.

But while these beautiful flies appear to us so idly and innocently employed, they are, in fact, the greatest tyrants of the insect tribe; and, like the hawk among birds, are only hovering up and down to seize their prey. They are the strongest and most courageous of all winged insects; nor is there one, how large soever, that

they will not attack and devour. The blue fly, the bee, the wasp, and the hornet, make their constant prey; and even the butterfly, that spreads so large a wing, is often caught and treated without mercy. Their appetite seems to know no bounds: they spend the whole day in the pursuit, and have been seen to devour three times their own size in the capture of a single hour. They seize their prey flying with their six claws, and tear it easily to pieces with their teeth, which are capable of inflicting troublesome wounds.

THE EPHEMERA.

That there should be a tribe of flies whose duration extends but to a day, seems at first surprizing; but the wonder will encrease, when we are told, that some of this kind seem to be born and to die in the space of a single hour. The larva, however, from which they are bred, is by no means so short lived; but is sometimes seen to live in the water two years, and many times, three years together, where earth and clay appear to be their only nourishment.

The larva when ready to quit that state rises to the surface of the water, and getting rid instantaneously of its skin becomes an aurelia with wings, which convey it to the nearest tree; upon this it settles, and in the same moment, undergoes its last change to a perfect ephemera.

The ephemera, in its fly state, is a very beautiful winged insect, and has a strong similitude to the butterfly, both from its shape and its wings. It is about the size of a middling butterfly; but its wings differ, in not being covered with the painted dust with which those of the butterflies are adorned and rendered opake, for they are very transparent and very thin. These insects have four wings, the uppermost of which are much the largest, and are furnished with three long black bristles at the extremity of the body: when the insect is at rest, it generally lays its wings one over the other, on the back. To acquire this beautiful appearance, the insect has been obliged, as we have seen, to undergo several changes of form: but its glory is very short lived, for the hour of its perfection is the hour of its death; and it seems scarcely introduced to pleasure, when it is obliged to part with life.

As there are several kinds of this animal, their aurelias are consequently of different colours: some yellow, some brown, and some cream-coloured. Some of these also bore them-

selves cells at the bottom of the water, from which they never stir out; in case, however, that the waters decrease, instinct teaches them to dig fresh holes lower down for their security. Others on the contrary, rise from the bottom to the surface, swim about in all directions, quit that element entirely, to feed upon plants by the river side, and then return to their favourite element for safety and protection.

As these insects are not natives of England, or Ireland, he who would see them in the greatest abundance, must walk, about sun-set, along the banks of the Rhine, or the Seine near Paris: where for about three days, in the midst of the summer, he will be astonished at their numbers and assiduity. The thickest descent of the flakes of snow in winter does not equal their number; the whole air seems alive with the new-born race; and the earth itself is all over covered with their remains. The aurelias, or reptile insects, that are as yet beneath the surface of the water, wait only for the approach of evening to begin their transformation. The most industrious shake off their old garments about eight o'clock; and those that are most tardy, are transformed before nine.

We have already seen that the operation of change in other insects is laborious and painful; but with these, nothing seems shorter, or

performed with greater ease. The aurelias are scarce lifted above the surface of the water, than their old sheathing skin bursts; and through the cavity which is thus formed, a fly issues, whose wings, at the same instant, are unfolded, and at the same time lift it into the air. Millions and millions of aurelias, rise in this manner to the surface; and at once become flies, and fill every quarter with their flutterings. But all these sports are shortly to have an end; for as the little strangers live but an hour or two, the whole swarm soon falls to the ground, and covers the earth for several hundred yards on each side of the river. Their numbers are then incredible, and every object they touch becomes fatal to them; for they instantly die, if they hit even against each other.

At this time the males and females are very differently employed. The males, unlike the males of other insects, neither follow the opposite sex, nor bear any enmity to each other: after fluttering for an hour or two, they drop on land and die. It is otherwise with the females; they are scarce risen from the surface of the water, and have dried their wings, but they hasten to drop their eggs back again.

As they flutter upon the surface, two clusters are seen issuing from the extremity of their body, each containing about three hundred and fifty eggs, which make seven hundred in all.

Thus of all insects, this appears to be the most prolific; and it would seem that there was a necessity for such a supply, as, in its reptile state, it is the favourite food of every kind of fresh-water fish. It is in vain that these little animals form galleries at the bottom of the river, from whence they seldom remove; many kinds of fish break in upon their retreats, and thin their numbers. For this reason, fishermen are careful to provide themslves with these insects, as the most grateful bait; and thus turn the fish's rapacity to its own destruction.

But though the usual date of those flies is two or three hours at farthest, there are some kinds that live several days; and one kind in particular, after quitting the water, has another case or skin to get rid of. These are often seen in fields and woods, distant from the water; but they are more frequently found in its vicinity. They are often found sticking upon walls and trees; and frequently with the head downwards, without changing place, or having any sensible motion. They are then waiting for the moment, when they shall be divested of their last incommodious garment, which sometimes does not happen for two or three days together.

THE LION-ANT.

The Lion-Ant is an insect that undergoes the same changes as the butter-fly; a larva or worm being first produced from the egg, which at the proper time, spins a web in which it encloses itself, till, at last, it bursts its way as a winged animal not unlike a small dragon-fly.

In the worm state, its appearance is unpleasing; the body is of a grey colour composed of rings that slip one upon another. It has six feet, and two small horns crooked at the ends. At the basis of the feelers there are two small black lively eyes, by which it can see the smallest object, as is easily discovered by its starting from every thing that approaches.

At first view there is no insect appears so little adapted for attacking others; other animals have wings or feet to enable them to advance towards their prey; but the lion-ant is unprovided with such assistance from either. It has legs indeed; but these only enable it to run backward, so that it could as soon die as make the smallest progressive motion. Providence must therefore furnish it with other means of supplying its wants, and we shall find the instincts given to it for this purpose such as Infinite Wisdom alone could implant. It survives the first winter in its larva state without

taking any nourishment, but in the spring it chuses a dry sandy place, at the foot of a wall, or under some shelter, in order to preserve its works from the rain. The driest and most sandy spot is the most proper for it; because a heavy clogged earth would defeat its labour. When it goes about to dig the hole where it takes it prey, it begins to bend the hinder part of its body, which is pointed, and thus works backward, making, after several attempts, a circular furrow, which serves to mark out the size of the hole it intends to make. Within this first furrow, it digs a second, then a third, and afterwards others, which are always less than the preceding. Then it begins to deepen its hole, sinking lower and lower into the sand, which it throws with its horns, or feelers, towards the edges, as we see men throw up sand in a gravel-pit. Thus, by repeating its labours all round, the sand is thrown up in a circle about the edge of the pit, until the whole is compleated. This hole is always formed in a perfect circle, and the pit itself resembles the inside of an inverted funnel. When this insect first leaves the egg and is newly hatched, the first pit it makes is very small; but as it grows bigger, it makes a larger hole, which is destined, like a pit-fall, to entrap its prey. It is generally about two inches deep, and as much in diameter.

The work being thus with great labour finished, the insidious insect places itself in ambush, hiding itself at the bottom under the sand in such a manner, that its two horns encircle the bottom of the pit. All the sides of this pit-fall are made of the most loose and crumbling materials ;so that scarcely any insect can climb up that has once got down to the bottom. Conscious of this, the lion-ant remains in patient expectation, ready to profit by that accident which throws some heedless little animal into its den. If an ant, a woodlouse, or a small caterpillar walks too near the edge of the precipice, the sand gives way beneath them, and they fall to the bottom of the pit, where they meet inevitable distruction. The fall of a single grain of sand gives the lion-ant notice at the bottom of its cave; and it never fails to sally forth to seize upon its prey. It happens sometimes, however, that the ant or the woodlouse is too nimble, and runs up the sides of the pit-fall, before the other can make ready to seize it. The lion-ant has then another contrivance, still more wonderful than the former; for, by means of its broad head and feelers, it has a method of throwing up a shower of sand, which falls upon the struggling captive with tremendous weight, and once more crushes it down to the bottom. When the insect is once fallen thus low, no effort can retrieve or release it: the lion-ant seizes it with its feelers,

which are hollow, and darting them both into its body, sucks out all the little animal's juices with the utmost voracity.

The next care of the little animal, is to remove the body from its cell, lest any other creature should be rendered aware of its danger; the insect, therefore, takes up the wasted trunk with its feelers, and throws it with wonderful strength, at least six inches from the edge of its hole, and then patiently sets about mending the breaches which its fortifications had received in the last engagement. Nothing can abate its industry, vigilance and patience. It will work for a week together to make its pit-fall; it will continue upon the watch for more than a month, patiently expecting the approach of its prey; and if it comes in greater quantities than is needful, yet still the little voracious creature will quit the insect it has newly killed, and leave it half eaten, to kill and attack any other that happens to fall into its hole: yet, though so voracious, it is surprisingly patient of hunger; some of them having been kept in a box with sand for six months and upwards, without feeding at all.

When the lion-ant is full grown, it spins a thread, in the manner of the spider: which being made of a glutinous substance, and being humid from the moisture of its body,

sticks to the little particles of sand among which it is spun; and in proportion as it is thus excluded, the insect rolls up its web, sand and all, into a ball, of which itself is the center. This ball is about half an inch in diameter; and within it the insect resides, in an apartment sufficiently spacious for all its motions. The outside is composed of sand and silk; the inside is lined with silk only, of a fine pearl colour, extremely delicate, and perfectly beautiful. But though the work is so curious within, it exhibits nothing to external appearance, but a lump of sand; and thus escapes the search of birds, that might otherwise disturb the inhabitant within.

The insect continues thus shut up for six weeks or two months; and gradually parts with its eyes, its feelers, its feet and its skin, all of which are thrust into a corner of the inner apartment, like a rag. The insect then appears almost in its winged state, except that there is a thin skin which wraps up the wings, and that appears to be nothing else but a liquor dried on their outside. Still, however, the little animal is too delicate and tender to venture from its retreat; but continues enclosed for some time longer: at length, when the members of this new insect have acquired the necessary consistence and vigour, it tears open its lodging, and breaks through its wall. For this purpose it has two teeth, like those of a

grasshopper, with which it eats through, and enlarges the opening, till it gets out. Its body, which is turned like a screw, takes up no more than the space of a quarter of an inch; but when it is unfolded, it becomes half an inch in length; while its wings, that seemed to occupy the smallest space, in two minutes time unfold, and become longer than the body. In short, it becomes a large and beautiful fly with a long, slender body, of a brown colour; a small head, with large bright eyes, long slender legs, and four large transparent wings. The rest of its habits resemble that insect whose form it bears; except that instead of dropping its eggs in the water, it deposits them in sand, where they are soon hatched into that rapacious insect so justly admired for its method of catching its prey.

THE SAWYER FLY.

The Sawyer Fly, so called from its faculty of sawing asunder the branches of trees, whose substance is its food, is about three inches in length, when full grown, and is a very singular insect. Its head has somewhat the appearance of that of an elephant, having a horny bill like the snout of that animal, bending upwards from

the under part, with another pointing downwards from the upper-part of the head, both of a jet black, and of a fine polish. On the inner surface of the upper bill are raised points, like the teeth of a saw, which are used by the insect in the same manner. Its body is like that of a beetle, but considerably larger, with double wings, the inner of which is like coarse gauze; and its legs are armed at each joint with crooked sharp nails, with the same on each toe, like a bird.

The process of this insect in sawing down branches of trees, is really admirable, but it is hardly possible to form an idea of the manner of doing it without a description. This work it performs by encircling the branch with its bills, the points of which it fastens well into the wood, and turning round it briskly by the strength of its wings, which make a loud buzzing noise, it in a short time saws the branch asunder. They are by many called Elephant Flies, from the great resemblance of their heads to that animal. They are perfectly harmless, and are caught only to be kept as curiosities.

BEES.

These insects are very numerous, and differ considerable in their habits. Some are found in extensive communities, constructing, with the utmost art, cells for their young, and repositories for their food; while others both dwell and work in solitude. The whole tribe live on the nectar of flowers and on ripe fruit. We shall, however, more particularly confine ourselves to the description of the Hive Bee.

In the history of Bees, their habitation is the first thing that deserves to be mentioned: as most people, however, are acquainted with its appearance, we shall confine ourselves to those particulars which are not so well known,

The walls of the cells are so extremely thin that their mouths might be thought in danger of suffering by the frequent entering and issuing of the Bees. To prevent this disaster, however, they make a kind of rim round the margin of each cell, and this rim is three or four times thicker than the walls.

It is difficult to perceive, even with the assistance of glass hives, the manner in which Bees

operate when constructing their cells. They are so eager to afford mutual assistance; and for this purpose so many of them crowd together, and are perpetually succeeding each other, that their individual operations can seldom be distinctly observed. It has, however, been discovered, that their two jaws are the only instruments they employ in modelling and polishing the wax. With a little patience and attention, we perceive cells just begun; we likewise remark the quickness with which a Bee moves its teeth against a small portion of the cell. This portion the animal by repeated strokes on each side, smooths, renders compact, and reduces to a proper thinness. While some of the hive are lengthening their six-sided tubes, others are laying the foundations of new ones. In certain circumstances, when extremely hurried, they do not complete their new cells, but leave them imperfect till they have begun a number sufficient for their present exigencies. When a bee puts its head a little way into a cell, we easily perceive it scraping the walls with the points of its teeth, in order to detach such useless and irregular fragments as may have been left in the work. Of these fragments, the bee forms a ball about the size of a pin's head, comes out of the cell, and carries this wax to another part of the work, where it is wanted; it no sooner leaves the cell than it is succeeded by another

bee, which performs the same office; and in this manner, the work is successively carried on till the cell is completely polished.

Their mode of working, and the disposition of their labour, when put into an empty hive, exhibit, in the strongest light, the sagacity of bees. They immediately begin to lay the foundations of their combs, which they execute with surprising quickness and alacrity. Soon after they begin to construct one comb, they divide into two or three companies, each of which in different parts of the hive is occupied in the same operations. By this division of labour, a great number of bees have an opportunity of being employed at the same time, and consequently, the common work is sooner finished. The combs are generally arranged in a direction parallel to each other. An interval or street between them is always left, that the bees may have a free passage, and an easy communication with the different combs in the hive. These streets are just wide enough to allow two Bees to pass one another. Besides these parallel streets, to shorten the journey when working, they leave several cross passages which are always covered.

They are extremely solicitous to prevent insects of any kind from getting admittance into their hives. To accomplish this purpose, and in order to shut out the cold, when they take possession of a new hive, they carefully examine

every part of it; and if they discover any small holes or chinks, they immediately paste them up firmly with a resinous substance which differs considerably from wax. This substance is known by the name of Propolis or Bee-glue. Bees use it for rendering their hives more close and perfect, in preference to wax, because it is more durable, and more powerfully resists the vicissitudes of the weather. This glue is not, like the wax, procured by an animal process. The Bees collect it from different trees, as the poplars, the birches, and the willows. It is a complete production of nature, and requires no additional manufacture from the animals by which it is employed. After a bee has procured a quantity sufficient to fill the cavities of its two hind legs, it repairs to the hive. Two of its companions instantly draw out the load, and apply it to fill up such chinks, holes, or other deficiencies as they find in their habitation. But this is not the only use to which Bees apply the propolis. They use it also to remove such insects or foreign bodies as happen to get admission into the hive. When so light as not to exceed their powers, they first kill the insect with hteir stings, and then drag it out with their teeth. But it sometimes happens that an ill fated snail creeps into the hive, this is no sooner perceived than it is attacked on all sides, and stung to death. But how are the bees to carry

out so heavy a burthen? Such a labour would be in vain. To prevent noxious odours consequent on its putrefaction, they immediately embalm it, by covering every part of its body with propolis, through which no effluvia can escape. When a snail with a shell gets entrance, to dispose of it gives much less trouble and expence to the bees. As soon as it has received the first wound from the sting, it naturally retires within its shell. In this case, the bees, instead of pasting it all over with propolis, content themselves with gluing it all round the margin of the shell; which is sufficient to render the animal for ever immovably fixed. But propolis, and the materials for making wax, are not the only substances that these industrious animals have to collect. As besides the whole winter, there are many days in the summer in which the bees are prevented by the weather from going abroad in quest of provisions; they are, therefore, under the necessity of collecting and amassing in cells destined for that purpose large quantities of honey. This they extract, by means of their trunk, from the nectariferous glands of flowers. After collecting a few small drops of honey with this, the animal carries them to its mouth, and swallows them. The bees are obliged to fly from one flower to another till they fill their first stomachs. When they have accomplished this, they return directly to the hive, and disgorge in a cell the

whole honey they have collected. It not unfrequently happens however, that on its way to the hive the bee is accosted by a hungry companion. How the one manages to communicate its wants to the other, it is perhaps impossible to discover. But the fact is certain, that when two bees meet in this situation, they mutually stop, and the one whose stomach is full of honey, extends its trunk, opens its mouth, and, like a ruminating animal, forces up the honey into that cavity. The hungry bee, with the point of its trunk, sucks the honey from the other's mouth. When not stopped on the road, the bee proceeds to the hive, and in the same manner offers its honey to those who are at work, as if it meant to prevent the necessity of quitting their labour in order to go in quest of food. In stormy or rainy weather, the bees feed on the honey laid up in open cells; but they never touch their reservoirs while their companions are enabled to supply them with fresh honey from the fields. But the mouths of those cells which are destined for preserving honey during the winter, they always cover with a lid, or thin plate of wax.

How numerous soever the bees in one swarm may appear to be, they all originate from a single parent. It is indeed surprising, that one small insect should, in a few months, give birth to so many young; but, on opening her body at a certain time of the year, eggs to the number of many thousand are to be found contained in it.

The queen is easily distinguished from the rest by the size and shape of her body. On her depends the welfare of the whole community; and by the attention that is paid to all her movements, it is evident how much they depend upon her security. She is seen, at times, with a numerous retinue, marching from cell to cell, plunging the extremity of her body into each of them, and leaving in each an egg.

A day or two after this egg is deposited, the grub is excluded from the shell, having the shape of a maggot rolled up in a ring, and lying softly on a bed of whitish coloured jelly, on which it begins to feed: the common bees then attend with astonishing tenderness and anxiety: they furnish it with food, and watch over it with unremitting assiduity. In about six days, the grub arrives at its full growth, when its affectionate attendants shut up the mouth of its apartment with wax, to secure it from injury. Thus inclosed, it soon begins to line the walls of its cell with a silken tapestry, in which it undergoes its last transformation.

The neuter bees in a hive amount to the number of 16,000 or 18,000. These are armed with stings, and form the only labouring part of the community. It is pleasant to see them in the act of collecting the mealy dust of flowers for the basis of their wax. They roll themselves in the flower-cup, the dust of which adheres to their

hairs; then bringing their feet over their bodies, they fill with it two small baskets or cavities edged with hairs, appended to their hind legs. As soon as a bee thus laden appears near the hive, others go out to meet it, and taking the dust from its legs, swallow it; their stomachs being the place where it is converted into genuine wax. This operation being over, each individual disgorges it in the consistency of dough, and then moulds it into proper form.

The males are called *drones*: they are unarmed; and are always killed by the neuters about the month of September.

Heat is the life of these insects. The least degree of cold benumbs them; and in winter, unless they are all crowded together, they perish. Their enemies are the wasp and the hornet, who with their teeth rip them open to suck out the honey contained in their bladder. Sparrows have also been seen with one in their bill, and one in each claw.

There is so great a degree of attachment subsisting between the working bees and their queen, that if, by any accident, she is destroyed, the labours of the community are at an end, and the rest of the animals leave the hive and disperse. If, however, another queen be given them, joy springs up, and they crowd around her, and soon again apply to their operations. Even the prospect of seeing a queen will support them:

this has been proved by giving to a hive that lost its own queen, the chrysalis of another. If a queen be taken from a hive and kept apart from the working bees, she will refuse to eat, and in the course of four or five days, will die of hunger.

THE WASP.

Though the Wasp can gather no honey of its own, there is no animal more fond of sweets. It will pursue the bee, destroy it with its sting, and then plunder it of the honey bag, which it bears home to its nest. The bees, however, are not always unresisting sufferers; fierce battles are sometimes seen to ensue, in which the bees make up by their numbers and courage what they want in strength. When no honey is to be had, they seek for the sweetest fruits of the garden, and wherever they are found, all other flies are seen to desert the place immediately. In this manner, the summer is passed in plundering the neighbourhood, and rearing up their young—every day adds to their numbers, and were they as long-lived as the bee, they would soon swarm upon the face of nature, and become a noxious plague to man; but, providentially, their power of doing mischief is limited,

for with the exception of a few females which survive the cold of winter, they live but a single season.

While the summer heats continue they are bold and voracious; but as the cold increases, they lose their courage and activity, and become unable to provide a supply for their growing progeny, which, a little before, they had fed with so much assiduity. In a short time, therefore, the worms die, and may be seen carried out by the wasps, who are probably directed by instinct to remove what would so soon putrify and render their nests unwholesome; still however their own sufferings continue, they have laid up no store for winter use, and are without defence against the cold, which at last becoming insupportable, they wither and die: the working wasps first, the males soon following, and many of the females suffering in the general calamity. In every nest however, one or two females survive the winter, and begin, in spring, to lay their eggs in a little hole of their own contrivance. This bundle of eggs which is clustered together like grapes, produces two worms, which the female takes proper precaution to defend and supply, and these, when, hatched, soon give assistance to their parent, who is employed in hatching two more. Thus is the community every day encreasing, till, from a single female, ten thousand wasps are seen produced before the month of June. After the female has thus produced her offspring

which are distributed in different districts, they assemble from all parts, in the middle of summer, and provide for themselves the large and commodious habitation which will be described below.

Such is the history of the social wasp: there are various tribes, however, that live in solitude; these lay their eggs in a hole for the purpose, and the parent dies long before the birth of its offspring.

From the end of May to the beginning of July, the solitary wasp or hornet is seen most diligently employed. The whole purpose of its life seems to be in contriving and fitting up a commodious apartment for its young one, which is not to succeed it till the year ensuing. For this end it is employed, with unwearied assiduity, in boring a hole into the finest earth, some inches deep, but not much wider than the diameter of its own body. This is but a gallery leading to a wider apartment destined for the convenient lodgment of its young. As it always chuses a gravelly soil to work in, the digging and hollowing this apartment is an enterprize of no small labour: for effecting its operations, this insect is furnished with two teeth, which are strong and firm, but not sufficiently hard to penetrate the substance through which it is resolved to make its way.

In order, therefore, to soften the earth, it is furnished with a gummy liquor which it drops upon

the place, and which renders it more easily separable from the rest, and the whole becoming a kind of soft paste is removed to the mouth of the habitation. The animal's provision of liquor in these operations is however soon exhausted; and it is then seen either taking up water from some neighbouring flower or stream in order to supply the deficiency.

At length, after much toil, a hole some inches deep is formed, at the bottom of which is a large cavity; and to this, no other hostile insect would venture to find its way, from the length and the narrowness of the defile through which it would be obliged to pass. In this, the solitary wasp lays its egg, which is destined to continue the species; there the future animal is to continue for above nine months, unattended and immured, and at first appearance the most helpless insect of the creation. But when we come to examine, new wonders offer, no other insect can boast so copious a supply of provision, or such confirmed security.

As soon as the mother-wasp has deposited the egg at the bottom of the hole, her next care is to furnish it with a supply of provisions, which may be offered to the young insect as soon as it leaves the egg. To this end, she procures a number of little green worms, generally from eight to twelve, and these are to serve as food for the young one the instant it awakens into life. When this supply is laid in, the old one then, with

as much assiduity as it before worked out its hole, now closes the mouth of the passage, and thus leaving its young one immured in perfect security, and with a copious supply of animal food, she dies satisfied with having provided for a future progeny.

When the young one leaves the egg it is scarcely visible, and is seen immured among a number of insects, infinitely larger than itself, ranged in proper order around it, which, however, give it no manner of apprehension. Its food lies at its hand, and it devours one after the other, as the calls of appetite incite it; after which, as the time of its transformation begins to approach; it spins a silken web, and continues fixed in its cell till the sun calls it from its dark abode, the ensuing summer.

The shape of the nest is that of an upright oval, often measuring ten or twelve inches at least in diameter: it consists of several horizontal stages or stories of six-sided cells, the interstices of each story being connected at intervals by upright pillars: and the exterior surface of the nest consists of a great many layers or pieces disposed over each other in such a manner as best to secure the interior cavity from the effects of cold and moisture; the whole nest, comprising both walls and cells, is composed of a substance very much resembling the coarse kinds of whitish brown paper, and consists of the fibres of various dry vegetable substances cemented by a gummy

fluid discharged from the mouth of the insects during their operations.* The female wasps deposit their eggs in the cells, one in each, which serves as a cradle for the young larva or maggot: this bears when hatched a near resemblance to that of bees: they are fed by the labouring wasps with a coarse kind of honey, and when arrived at their full size, close up their respective cells with a fine tissue of silken filaments, and after a certain period emerge in their complete or perfect form. The male insect, like the bee, is destitute of a sting; the society, or swarm of the common wasp, consists of a vast number of neutral or labouring insects, a much smaller number of males, and still fewer females. Wasps in general feed both upon fruits and flesh. A highly elegant wasp's nest is sometimes seen in the West Indies, attached or hanging by its base to some straw, or other projecting substance from the upper part of buildings or out-houses. It does not much exceed the size of an egg, but is of a more globular form, and consists of several cells, one within the other, with considerable intervals between each, the interior alone being entire, and furnished with a small round orifice: in the centre of this, is situated the collection of cells, built round a small central pillar attached to the base: they are not very numerous.

* The honey comb of the bee is built edgeways with respect to the hive, that of the wasp is flat, and the mouth of every cell opens downwards.

To this account of the wasp we shall add an instance of the sagacity of this insect, which was observed by Dr. Darwin.—"A wasp on a gravel walk had caught a fly, nearly as large as himself; kneeling on the ground, I observed him," says the doctor, "separate the tail and the head from the body part, to which the wings are attached. He then took the body part in his paws, and rose about two feet from the ground with it; but a gentle breeze wafting the wings of the fly, turned him round in the air, and he settled again with it upon the gravel. I then distinctly observed him cut off, with his mouth, first one of the wings, and then the other, after which he flew away with it unmolested by the wind."

A wasp carrying out a dead companion from the nest, if she finds it too heavy, cuts off the head, and carries out the load in two portions.

Mr. Ray, who was a great admirer of the wonderful works of creation, relates the following interesting story of a wasp:

"I observed," says he, "one of them dragging a green caterpillar thrice its own size: it laid this down near the mouth of a burrow that it had made in the ground, then removing a little ball of earth, with which it had covered the orifice, it first went down itself, and after staying a short time, returned, and seizing the caterpillar again, drew it down with him. Then leaving it there, it came up, and taking

some little globules of earth, rolled them one by one into the burrow, scraping the dust in by intervals, with its fore-feet, in the manner of a dog, thus alternately rolling in pieces of earth, and scraping in dust, till the hole was full; sometimes going down (as it seemed to me) to press down the earth; and once or twice flying to a fir-tree, which grew near, perhaps to get turpentine to glew it down, and make it firm. The hole being filled, and equalled with the surface of the earth, that its entrance might not be discovered, it took two fir-leaves that were near, and laid them by the mouth, most probably to mark the place."

ANTS

Live in large societies, somewhat in the manner of bees or wasps, and are, like them, divided into males, females, and neutrals. This latter class appears to conduct the business of the nest, which is usually at a small distance from the surface, in some slight elevation, either prepared by the insects themselves, or previously formed by some other animals, as moles, &c. They feed on both animal and vegetable substances, devouring the smallest kinds of in-

sects, caterpillars, &c. as well as fruits of different kinds. The fondness of ants for animal food is often turned to good account by anatomists. When they wish to obtain the skeleton of any animal, too small or delicate to admit of being prepared in the usual way, the animal is disposed in a proper position, in a small box, with perforations in the lid, and deposited in a large ant-hill; in consequence the softer parts are eaten away, and the skeleton remains. Thus, very elegant skeletons of frogs, snakes, &c. may be obtained.

The common or black ant is a well known inhabitant of our fields and gardens, residing in great numbers between molehills and other elevated spots. It is of a brownish black colour, and of a glossy or polished surface. The eggs of this species are deposited early in the spring, and are extremely small, and of a white colour. From these are hatched the larvæ, which are of a thickish form, destitute of legs, and somewhat resemble, in miniature, the maggots of wasps and bees. They are carefully nourished by the neutrals or labouring ants, till they are arrived at their full growth, when they inclose themselves in smooth, oval, pale yellow silken webs, or cases, in which state they are known by the mistaken title of ant-eggs; the real eggs, as before observed, being white, and extremely small. It is generally in the months of June and July, that the larvæ thus inclose them-

selves. The chrysalis, if taken out of its silken case, is of a white colour, and exhibits all the limbs of the future animal in an imperfect or contracted state. During the time of their remaining in chrysalis, the neutral ants attend them with the same care as when in their larvæ state, frequently shifting their situation, and placing them at greater or smaller elevations, according to the different state of the atmosphere.

About the latter end of July, or the beginning of August, the males and females may be observed in the nests: these differ from the neutrals in being furnished with wings, and the female is far larger than the male; the body equalling in size that of the common window-fly, and the upper wings being very long and large. At this time of the year, the males and females emigrate in vast numbers, sometimes flying at a considerable height, and sometimes creeping along the surface. It is not uncommon to see them enter houses at this period, attracted by sweets in particular, either moist or dry. During the winter, this species, like the rest of the European Ants, remain in a state of torpor, and in the spring emerge from their concealment, and recommence their labours.

The most perfect specimens of architecture are generally exhibited by the smaller ants. The brown ant is particularly remarkable among the masonic tribes. Their nests are

formed of parallel or concentric stories, each four or five lines in height; the partitions being about half a line in thickness, and built of such fine materials, that the interior appears perfectly smooth. On examining each of these stories, we discover chambers of different sizes, having long galleries of communication. The cielings of the larger spaces are supported by small pillars, sometimes by slender walls, and in other cases by arches. Some cells have but a single entrance; others have passages, which open from the story underneath. In other parts, still larger central spaces, or halls, are met with, in which, a great number of passages terminate, like the streets and avenues to a market place. The whole nest often contains twenty of these stories, above the level of the ground, and at least as many below it. The use of this numerous series of rooms will appear in the sequel. The surface of the next is covered with a thicker wall, and has several doors, admitting, in the day-time, free ingress and egress. This species of ant is unable to bear much heat. During the day, and particularly when the sun shines, their doors are closed, and they either keep at home, or venture out only through the subterraneous passages. When the dew has given freshness to the nest, and softened the earthy materials on its surface, they begin to make their appearance above ground. On the first shower of rain that

occurs, the whole swarm are apprized of it, and immediately resumes their architectural labours. While some are ergaged in removing the earth below, others are employed in building an additional story on the top; the masons making use of the materials furnished by the miners. The plan of the cells and partitions is first traced in relief on the walls, which are seen gradually to arise, leaving empty spaces between them. The beginnings of pillars indicate the situation of the future halls; and the rising partitions show the form of the intended passages. Upon the plan thus traced they continue building, till they have arrived at a sufficient elevation. Masses of moistened earth are then applied at right angles to the tops of the walls, on each side, and continued in a horizontal direction, till they meet in the middle. The cielings of the larger chambers are completed in the same manner; the workers beginning from the angles of the walls, and from the tops of the pillars which have been raised in the centre. The largest of these chambers, which might be compared to the *town-hall,* and which is frequently more than *two inches* in diameter, is completed with apparently as much ease as the rest. This busy crowd of masons, arriving in every direction, laden with materials for the building, hastening to avail themselves of the rain to carry on their work, and yet observing the most perfect order in their operations, pre-

sent the most interesting and amusing spectacle. They raise a single story, in about seven or eight hours, forming a general roof as a covering to the whole; and they go on, adding other stories, so long as the rain affords them the facility of moulding the materials. When the rain ceases, and is succeeded by a drying wind, before they have completed their work, the earth ceasing to adhere together and crumbling into powder, frustrates all their labours: as soon as they find this to be the case, they, with one accord, set about destroying the cells which they had begun, but had not been able to cover in, and distribute the materials over the upper story of what they had completed.

In tracing the design of the cells and galleries, each ant appears to follow its own fancy. A want of accordance must therefore frequently take place at the points where their works join; but they never appear to be embarrassed by any difficulties of this kind. An instance is related by M. Huber, in which two opposite walls were made of such different elevations, that the ceiling of the one, if continued, would not have reached above half way of the height of the other. An experienced ant arriving at the spot, seemed struck with the defect, and immediately destroyed the lower ceiling, built up the wall to the proper height, and formed a new ceiling with the materials of the former.

The following is an interesting description of the economy, and good management of ants, in their subterraneous dwellings, prepared by a gentleman, who, for a long time, made them the particular object of his study.

"In a room next to mine," says he, "which had been empty for a long time, there was upon a window a box full of earth, two feet deep, and fit to keep flowers in. That kind of parterre had been long uncultivated; and therefore it was covered with old plaster, and a great deal of rubbish, that fell from the top of the house, and from the walls, which together with the earth formerly imbibed with water, made a kind of dry barren soil. The place lying to the south, and out of the reach of the wind and rain, also in the neighbourhood of a granary, was a most delightful spot of ground for ants, and therefore they had made three nests there, doubtless for the same reason that men build cities in fruitful and convenient places, near springs and rivers.

I made it my business to procure them all sorts of conveniencies. I took out of the box every thing that might be troublesome to them; and frequently visited my ants, and studied their actions. Being used to go to bed very late, I went to see them work in a moon-light night: and I frequently got up in the night, to take a view of their labours. I always found some going up and down, and very busy: one

would think that they never sleep. Every body knows that ants come out of their holes in the day time, and expose to the sun, the corn, which they keep under ground in the night. Those who have seen ant-hillocks, have easily perceived those small heaps of corn about their nests. What surprised me at first was, that the ants never brought out their corn, but in the night when the moon shone, and kept it under ground in the day time; which was contrary to what I had seen, and saw still practised, by those insects in other places. I quickly found out the reason of it. There was a pigeon-house not far from thence: pigeons and birds would have eaten their corn, if they had brought it out in the day time. It is highly probable they knew it by experience, and I frequently found pigeons and birds in that place, when I went to it in a morning. I quickly delivered them from those robbers. What is most admirable (and what I could hardly believe, if I did not know it by experience), is, that those ants knew some days after that they had nothing to fear, and began to lay out their corn in the sun. However, I perceived they were not fully convinced of being out of all danger; for they durst not bring out their provisions all at once, but by degrees, first in a small quantity, and without any great order, that they might quickly carry them away in case of any misfortune, watching

and looking every way. At last, being persuaded that they had nothing to fear, they brought out all their corn, almost every day, and in good order, and carried it in at night.

The corn, that is laid up by ants, would shoot under ground, if those insects did not take care to prevent it. They bite off all the buds before they lay it up; and therefore the corn that has lain in their nests will produce nothing. Any one may easily make this experiment, and even plainly see that there is no bud in their corn. But though the bud be bitten off, there remains another inconvenience, that corn must naturally swell and rot under ground; and therefore it could be of no use to the nourishment of ants. Those insects prevent that inconvenience by their labour and industry, and contrive the matter so, that corn will keep as dry in their nests, as in our granaries.

They gather many small particles of dry earth, which they bring every day out of their holes, and place them round, to heat them in the sun. Every ant brings a small particle of the earth in her pincers, lays it by the hole, and then goes and fetches another. Thus, in less than a quarter of an hour, one may see a vast number of such small particles of dry earth heaped up round the hole. They lay their corn under ground upon that earth, and cover it with the same. They perform this

work almost every day, during the heat of the sun; and though the sun went from the window about three or four of the clock in the afternoon, they did not remove their corn and the particles of earth, because the ground was very hot, until the heat was over.

Being willing to be more particularly informed of their forecast and industry, I put a small heap of wheat in a corner of the room, where they stationed themselves; and to prevent their fetching corn out of the garret, I shut up the window, and stopt all the holes. Though ants are very knowing, I do not take them to be conjurers; and therefore they could not guess that I had put some corn in that room. I perceived, for several days, that they were very much perplexed, and went a great way to fetch their provisions. I was not willing, for some time, to make them more easy; for I had a mind to know whether they would, at last, find out the treasure, and see it at a great distance; or, whether smelling enabled them to know what is good for their nourishment. Thus they were some time in great trouble, and took much pains: they went up and down a great way, looking out for some grains of corn. They were sometimes disappointed, and sometimes they did not like their corn, after many long and painful excursions. What appeared to me wonderful, was, that none of them came home without bringing something: one brought a

grain of wheat, another a grain of rye or oats, or a particle of earth, if he could get nothing else.

The window, upon which those Ants had made their settlement, looked into a garden, and was two stories high. Some went to the farther end of the garden, others to the fifth story, in quest of some corn. It was a very hard journey for them, especially when they came loaded with a pretty large grain of corn, which must needs be a heavy burden for an ant, and as much as he can bear. The bringing of that grain from the middle of the garden to the nest, took up four hours; by which, one may judge of the strength and prodigious labour of those little animals. It appears from thence, that an ant works as hard as a man, who should carry a very heavy load on his shoulders almost every day for the space of four leagues. Some of them were strangely perplexed, and could not get to their journey's end. In such a case, the strongest ants, or those that were not so weary, having carried their corn to their nests, came down again to help them. Some were so unfortunate as to fall down with their load, when they were almost come home. When this happens, they seldom lose their corn, but carry it up again.

I saw one of the smallest carrying a large grain of wheat with incredible pains; when he came to the box where the nest was, he made so much haste that he fell down with his load,

after a very laborious march: such an unlucky accident would have vexed a philosopher. I went down, and found him with the same corn in his paws: he was ready to climb up again. The same misfortune happened to him three times. Sometimes he fell in the middle of his way, and sometimes higher; but he never let go his hold, and was not discouraged. At last, his strength failed him, he stopt, and another ant helped him to carry his load, which was one of the largest and finest grains of wheat that an ant can carry. It sometimes happens that a corn slips out of their paws, when they are climbing up; they take hold of it again, when they can find it; otherwise they look for another, or take something else, being ashamed to return to their nest without bringing something. This I have experienced, by taking away the grain which they looked for. All these experiments may easily be made by any one that has patience enough. They do not require so much patience as ants have; but few people are capable of it.

Thus my ants were forced to make shift for a livelihood, when I had shut up the garret, out of which they used to fetch their provisions. At last, being sensible that it would be a long time before they could discover the small heap of corn which I had laid up for them, I resolved to show to them.

I, accordingly, took one of the largest ants, and threw her upon that small heap of wheat. She was so glad to find herself at liberty, that she ran away to her nest, without carrying off a grain; but she observed it; for, an hour after, all my ants had notice given them of such a provision, and I saw most of them very busy in carrying away the corn I had laid up in the room. I leave you to judge, whether it may not be said, that they have a particular way of communicating their knowledge to one another; for, otherwise how could they know, one or two hours after, that there was corn in that place? It was quickly exhausted; and I put in more, but in a small quantity, to know the true extent of their appetite, or prodigious avarice; for, I make no doubt but they lay up provisions against the winter. We read it in Holy Scripture; a thousand experiments teach us the same; and I do not believe that any experiment has been made that shows the contrary.

As the small ant (for she instructs the man,
And preaches labour) gathers all she can,
And brings it to increase her heap at home,
Against the winter, which she knows will come:
But when that comes, she creeps abroad no more,
But lies at home, and feasts upon her store.

Though the box full of earth, where the ants had made their settlement, was generally free

from rain; yet it rained sometimes upon it, when a certain wind blew. It was a great inconvenience for those insects: Ants are afraid of water; and when they go a great way in quest of provisions, and are surprised by the rain, they shelter themselves under some tile, or something else, and do not come out until the rain is over. The ants of the principal nest found out a wonderful expedient to keep out the rain: there was a small piece of flat slate, which they laid over the hole of their nest in the day-time, when they foresaw it would rain, and almost every night. Above fifty of those little animals, especially the strongest, surrounded that piece of slate, and drew it equally in wonderful order; they removed it in the morning, and nothing could be more curious than to see those little animals about such a work. They had made the ground uneven about their nest, insomuch that the slate did not lie flat upon it, but left a free passage underneath. The ants of the other two nests did not so well succeed in keeping out the rain. They laid over their holes several pieces of old dry plaster one upon the other; but they were still troubled with the rain; and the next day, they took much pains to repair the damage. Hence it is, that those insects are so frequently to be found under tiles, where they settle themselves to avoid the

rain. Their nests are at all times covered with those tiles, without any incumbrance, and they lay out their corn and their dry earth, in the sun, about the tiles, as one may see every day. I took care to cover the two ants' nests that were troubled with the rain: as for the capital nest, there was no need of exercising my charity towards it.

An ant never goes into any other nest but her own; and if she should venture to do it, she would be turned out, and severely punished.—I have often taken an ant out of one nest, to put her into another; but she quickly came out, being warmly pursued by two or three other ants. I tried the same experiment several times with the same ant; but at last the other ants grew impatient, and tore her to pieces. I have often frighted some ants with my fingers, and pursued them as far as another hole; stopping all the passages to prevent their going to their own nest. It was very natural for them to fly into the next hole: many a man would not be so cautious, and would throw himself out of the windows, or into a well, if he were pursued by assassins. But, the ants I am speaking of avoided going into any other hole but their own, and rather tried all other ways of making their escape. They never fled into another nest, but at the last extremity; and sometimes chose rather to be taken, as I have often experienced. It is

therefore an inviolable custom among those insects, not to go into any other hole but their own. They do not exercise hospitality; but they are very ready to help one another out of their holes. They put down their loads at the entrance of a neighbouring nest; and those that live in it, carry them in.

They keep up a sort of trade among themselves; and it is not true that those insects are not fond of lending: I know the contrary: they lend their corn; they make exchanges; they are always ready to serve one another; and I can assure you, that more time and patience would have enabled me to observe a thousand things more curious and wonderful than what I have mentioned. For instance, how they lend and recover their loans; whether it be in the same quantity, or with usury; whether they pay the strangers that work for them, &c. I do not think it impossible to examine all those things; and it would be a great curiosity to know by what maxims they govern themselves; perhaps such a knowledge might be of some use to us.

They are never attacked by any enemies in a body; as is reported of bees. Their only fear proceeds from birds, which sometimes eat their corn when they lay it out in the sun; but they keep it under ground, when they are afraid of thieves. It is said that some birds eat them; but I never saw an instance of it. They are also infested by small worms; but they turn

them out, and kill them. I observed that they punished those ants which probably had been wanting to their duty; nay, sometimes they killed them, which they did in the following manner:—Three or four ants fell upon one, and pulled her several ways, until she was torn to pieces. Generally speaking, they live very quietly; from whence I infer that they have a very severe discipline among themselves, to keep so good an order; or that they are great lovers of peace, if they have no occasion for any discipline.

Whatever misfortune happens to them, their care and industry find out a remedy for it; nothing discourages them. If you destroy their nests, they will be repaired in two days. Any body may easily see how difficult it is to drive them out of their habitations without destroying the inhabitants; for, as long as there are any left, they will maintain their ground.

We shall conclude this account with one more instance of this little animal's extraordinary sagacity:—A gentleman of Cambridge one day remarked an ant dragging along, what, with respect to its strength, might be denominated a piece of timber. Others were severally employed, each in its own way. Presently this little creature came to an ascent, where the weight of the wood seemed for a while to overpower him: he did not remain long

perplexed with it; for three or four others observing his dilemma, came behind, and pushed it up. As soon, however, as he had got it on the level ground, they left it to his care, and went to their own work. The piece he was drawing happened to be considerably thicker at one end than the other. This soon threw the poor fellow into a fresh difficulty: he unluckily dragged it between two bits of wood. After several fruitless efforts, finding it would not go through, he adopted the only mode that a reasonable being, in similar circumstances, could have taken; he came behind, pulled it back again, and turned it on its edge; when, running again to the other end, it passed through without the least difficulty.

THE ANTS OR EMMETS.

These Emmets, how little they are in our eyes!
We tread them to dust, and a troop of them dies,
Without our regard or concern:
Yet, as wise as we are, if we went to their school,
There's many a sluggard, and many a fool,
Some lessons of wisdom might learn.

They don't wear their time out in sleeping or play,
But gather up corn in a sun-shiny day.
And for winter they lay up their stores:
They manage their work in such regular forms,
One would think they foresaw all the frosts and the storms,
And so brought their food within doors.

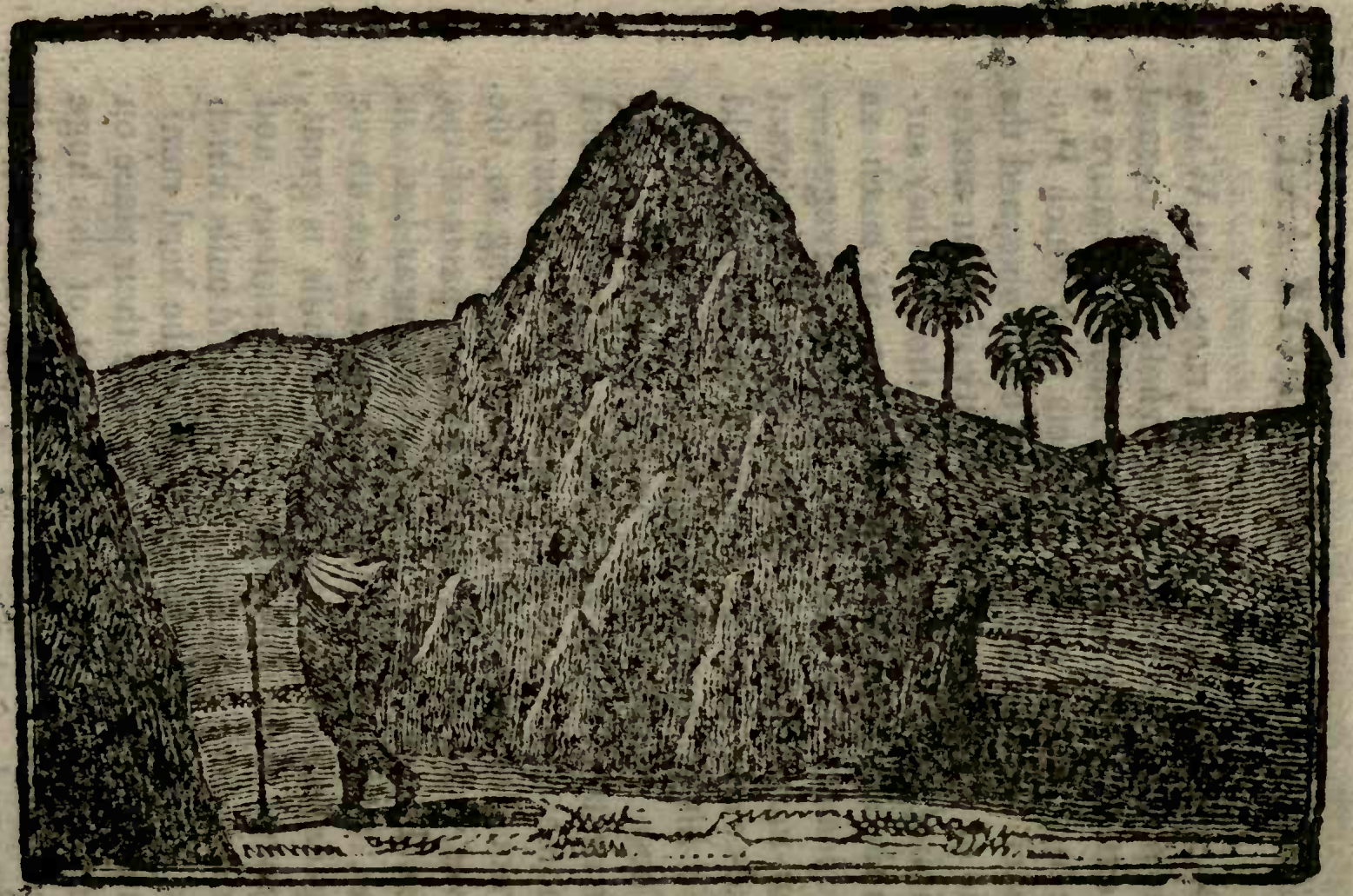
But I have less sense than a poor creeping ant,
If I take not due care for the things I shall want,
Nor provide against dangers in time,
When death and old age shall stare in my face,
What a wretch shall I be in the end of my days,
If I trifle away all their prime!

Now, now, while my strength and my youth are in bloom,
Let me think what will save me when sickness shall come,
And pray that my sins be forgiven.
Let me read in good books, and believe, and obey,
That when death turns me out of this cottage of clay,
I may dwell in a palace in heaven,

THE TERMES, OR WHITE ANT.

Of all animals of the Insect race, the White Ant is the most wonderful, whether we regard the extent of the mischief so small a creature is able to produce, or the instincts with which Providence has endued it. They have obtained the name of Ants from the similarity in their modes of living to the common ant, though they surpass them in the arts of building, as much as Europeans excel the most ignorant savages.—Their industry also in providing for future want affords even man an example which he would find it his advantage to imitate.

These insects abound in warm climates, and their nests or hills, are of such magnitude, and so numerous, as in some places to give the appearance of a group of huts belonging to the natives. In Africa, and in certain parts of the West Indies, they resemble a sugar-loaf in shape, and rise from ten to twelve feet above the ground. The height of these hills is great, compared with the size of the architect, and their structure is so firm, that the wild bulls which stand as centinels to the rest of the herd ruminating on the plain, generally take their place on one of them. The commencement of this huge cone is a small turret or two, about a foot in height, and of the sugar-loaf shape; at a little



THE NEST OF THE WHITE ANTS OF AFRICA.

distance, other turrets of a similar kind, are raised; when, by encreasing the number, and augmenting the size, the base of the building is covered with them, the highest and largest remaining in the centre, till, by filling up the intervals between them, they are gradually formed into one large dome. When this is effected, they take away the middle ones entirely, (except the tops, which, united, make the crown of the cupola,) and then apply the same clay to some other purpose.

In each community, there are three orders of inhabitants, which are in fact but different states of the same insect. The first state is that of the labourer, or working insects, which are always the most numerous; they are then about a quarter of an inch long. In their second, they assume a different form, and are then called soldiers; their bulk is now increased to the size of fifteen labourers, and their sole employment that of defending the community from the attack of an enemy.—The mouth has now undergone a remarkable change, evidently suited to the new office of its owner. Whilst a labourer, the mouth was calculated for gnawing and taking hold of bodies, but now that it is impelled by instinct to guard its habitation, offensive weapons become requisite; it is accordingly furnished with a formidable pair of pincers, capable of inflicting a painful wound. These pincers are placed in a strong horny

head larger than all the rest of the body. The third change is still greater, almost every part s altered from its original form, and four brownish, large transparent wings appear, to enable the perfect Termes to seek a convenient spot for a new settlement. This remarkable alteration takes place just before the rainy season begins. The bodies of these are now enlarged to the size of thirty labourers, and on each side of the head is a large round eye; but whilst the creature lived under ground, no eyes were visible.

Their disposition is now as much changed as their figure, since from being the most fierce and active animals, they become the most harmless and most timid, without the means of resisting their numerous enemies. The greater number of these flies which emigrate from the parent state, perish in the course of a few hours, and become the prey of innumerable birds, reptiles, insects, and even of man, being esteemed a nourishing, delicate food, that needs no other cooking than simply roasting before the fire. The first thunder storm, also, which generally occurs at the very time, when their wings have fitted them for wandering through the air, destroys multitudes of them; and it is probable that not more than one pair in several millions, escapes in safety, to be the parents of a new colony.

How admirable is the design of Providence in this arrangement! This little insect has, like all other animals, its distinct part to perform in the economy of Nature. Whilst a labourer, it contributes to the salubrity of the air, by destroying putrid substances, which, in sultry climates would, if left to a gradual decay, produce the most baneful effects; it is furnished with the several instincts necessary for its preservation and defence just so long as its usefulness continues, and at the moment, when it is preparing to continue its species, those various checks are at hand to keep down their numbers, lest they should multiply too abundantly, and prove an injury rather than a benefit.

The few pairs that are so fortunate as to survive the numerous casualties that assail them, are found by some of the labouring insects, (numbers of which, at this season, are running continually on the surface of the ground, on the watch for them,) and conveyed immediately to a place of security. They enclose them in a small chamber of clay adapted to their size, leaving at first but one small entrance, just large enough for themselves and the soldiers to pass, but much too small for either of the winged insects to escape, and when necessary, they encrease the number of entrances, but not their size. Round this chamber, are distributed the nurseries whither the eggs are carried by the labourers as

soon as they are excluded. These receptacles for hatching the young, are all composed of wooden materials joined together with gum, and cased with clay, and have galleries of communication from one to another. The mechanical skill displayed in the contrivance of these chambers and passages, they being all arched so as to support each other, must be attributed to instinct; for the termites are not endowed with any faculties superior to other insects, if required to act out of that line marked for them by Providence. In constructing their habitations, providing materials, guarding their infant progeny, collecting food, and defending themselves against their enemies, their instincts are admirable, and assume the appearance of order and design; but take one of them away from its fellows, and place it in a situation entirely new to it, it has no judgment to direct its conduct, or to extricate it from its situation; therefore its habits, however wonderful, (and they are truly so, as will be further shewn,) are only the irresistible effects of impulse, and performed without a knowledge of the future, or a motive of chusing one mode of building in preference to another.

Great precautions are taken to keep the apartments dry. Between the ceiling of the upper story of chambers and the dome, there is an open space to carry off any water that might enter by accident, which communicates by passages with

a number of pipes or channels that run at the base in various directions. These passages are lined with the same kind of clay of which the hill is composed, and ascend the inside of the shell in a spiral manner, intersecting each other at different heights till they reach the top: from every part of the large galleries, issue small pipes, or lesser galleries, leading to different parts of the building. Many of these run under ground, descending into the earth three or four feet perpendicularly; from whence the labourers collect the finer particles, which, after being worked in their mouths to the consistence of mortar, become that solid clay of which their hills, and all their buildings, except the nurseries, are composed. Some of these pipes extend to a vast distance, at least with respect to such minute creatures, being carried out more than a hundred yards from their main city. The large galleries are the great thoroughfares, and are well calculated, by their spiral direction, for that purpose; as the termites have great difficulty in ascending a perpendicular, particularly the soldiers, probably, from the weight and size of their head. If any part of the building happens to be upright, the inconvenience of ascending it, is often obviated by a road, made like a flat ledge, directed in the manner of those roads which are cut on the sides of steep hills to render the passage easier.

The King and Queen when once shut up in their solitary cell, never quit it. The Queen, like the Queen-bee, is the mother of the whole community, and about this time undergoes a considerable change in the size of the lower part of her body, which stretches out like a bag of enormous bulk, compared with the size of the labourer. This receptacle of eggs previous to the change, was only about half an inch long, and in the course of two years, it sometimes increases to the length of six inches. Some queens have been observed to lay sixty eggs in a minute, which would amount to eighty thousand in the 24 hours. The labourers remove these eggs as soon as they are deposited, and convey them, as before mentioned, to the nurseries. As soon as the young are hatched, they nurse them with the tenderest care, and supply all their wants till they are able to take their share in the labours of the community.

On opening one of their hills, a general alarm is excited, some of the fighting insects run to the breach as if to examine what is the cause of the attack.—In a short time, these are followed by a large body, which rush out as fast as the breach will permit them, their quick motions express rage and fury; in their hurry they sometimes miss their hold, and tumble down the sides of the hill, but recover themselves as soon as possible, and run about in all directions, biting every thing they run

against, and if they get hold of the assailant, they will, in a moment, let out as much blood as would outweigh their whole body: on the other hand, give them no further interruption, and the fighters will retire into the nest as if they supposed the enemy to be gone beyond their reach. Before they are all in, the labourers appear, hastening to the breach, each with a load of mortar in his mouth, ready tempered. This they stick upon the breach, as fast as they come up, and do it with so much dispatch, that, although there are myriads of them, they never embarrass each other: while they are thus employed, the soldiers have disappeared, except here and there one in the midst of several hundred labourers who seems to overlook the work, and hasten their operations by making a ticking noise with his forceps, which the others always answer by a loud and general hiss. On renewing the attack, the same scene is repeated: but it is remarkable, that each class adheres to its own instincts; for, let the emergency be ever so great, the one order never attempts to fight, nor the other to work.

It is difficult to give an European an idea of the ravages these little creatures occasion; indeed it seems like a traveller's wonder to say, that a little insect, not larger than an ant, can undermine houses, destroy the supports and the wood work, make its way through the floors, consume clothes, furniture, books, and every

other article that is not made of stone, or of metal. If the natives abandon a town composed of wooden houses, these industrious ravagers will clear it away so completely, that, in two or three years, a thick wood arises on the vacant space, and not a vestige of a house remains, unless any of the posts were made of iron-wood.

Some instances of their rapacity may be amusing to those not interested in the consequences:

A party of ants once discovered a cask of Madeira wine, and worked so effectually on the staves as to let out the liquor.—In India, it is necessary that all boxes or presses should be laid on glass feet, which the ant cannot ascend if they are kept free from dust; any neglect in this particular, however, is soon perceived by them, and they advance in myriads to their work. Not long ago a gentleman in the East Indies left home, to visit a friend, and intending to absent himself for some days, he locked up one of his rooms which contained his books and papers. The walls of the apartment were whitewashed, and adorned with pictures in frames, and glazed. Returning on an evening and taking a slight view by candle-light, he saw every thing apparently in the same state as he had left it. The next morning, however, he thought the glasses appeared uncommonly dull, and the frames covered with dust, but found, to his great astonish-

ment on attempting to wipe them, that the glasses were fixed to the wall by a kind of cement formed by the white ants, who had actually eaten up the deal frames, the back boards, and the greater part of the paper. They had also made considerable progress in consuming the books and linen which were in the boxes, having crept up the glass feet, by means of the dust which had collected on them.

The species of white ant that committed these depredations, is about the size of a grain of rice!

The larger species chiefly make their approaches under ground, penetrating beneath the foundation of houses or stores, and rising again, either through the floors, or by entering the bottom of the posts that support the building, when they follow the course of the fibres, and make their way to the top, boring holes and cavities in different places as they proceed. Multitudes enter the roof, and intersect it with pipes or galleries, formed of wet clay; which serve for passages in all directions, and enable them more readily to fix their habitations in it. They prefer the softer woods, such as pine and fir, which they hollow out with such nicety, that they leave the surface whole, after having eaten away the inside. A shelf, or plank, attacked in this manner, looks solid to the eye, when, if weighed, it will not out-balance two sheets of pasteboard of the same dimensions.

It sometimes happens that they carry this operation so far on stakes in the open air, as to render the bark too flexible for their purpose; when they remedy the defect, by plastering the whole stick with a sort of mortar that they make with clay; so that on being struck, the form vanishes, and the artificial covering falls in fragments on the ground. In the woods, when a large tree falls, from age or accident, they enter it on the side next the ground, and devour at leisure, till little more than the bark is left. But, in this case, they take no precaution of strengthening the outward defence, but leave it in such a state as to deceive an eye unaccustomed to see trees thus gutted of their insides. It is an extraordinary fact, that when these creatures have formed pipes in the roof of a house, instinct directs them to prevent its fall, which would ensue from their having sapped the posts on which it rests; but as they gnaw away the wood, they fill up the interstices with clay, tempered to a surprising degree of hardness: so that, when the house is pulled down, these posts are found transformed from wood to stone.

Such is the history of a little animal whose instincts are not inferior to those of any other class of animated nature. We have mentioned the size of the workman, &c. the extent and solidity of the building which he raises, and the disproportion of the two is so wonderful,

that we trust our young readers will perceive the good effect of union, industry, and perseverance. Let us draw from it, therefore, the important moral, that if in the more important concerns of life we form our plans with prudence, and act upon them with steadiness, success will most generally attend upon our undertakings.

THE ZIMB.

Of this very formidable African fly, we give the following interesting description from Mr. Bruce:

"This insect," says Mr. Bruce, "is a proof how fallacious it is to judge by appearances. If we consider its small size, its weakness, want of variety or beauty, nothing in the creation is more contemptible and insignificant. Yet passing from these to his history, and to the account of his powers, we must confess the very great injustice we do him, from want of consideration. We are obliged with the greatest surprise to acknowledge, that those huge animals, the elephant, the rhinoceros, the lion, and the tiger, inhabiting the same woods, are still vastly his inferiors; and that the appearance of this small insect, nay, his very sound,

though he is not seen, occasions more trepidation, movement, and disorder, both in the human and brute creation, than would whole herds of these monstrous animals collected together, though their number was in a tenfold proportion greater than it really is.

"This insect is called Zimb; it has not been described by any naturalist. It is in size very little larger than a bee; and has wings, which are broader than those of a bee, placed separate like those of a fly. As soon as this plague appears, and their buzzing is heard, all the cattle forsake their food, and run wildly about the plain till they die, worn out with fatigue, fright, and hunger. No remedy remains for the residents on such spots, but to leave the black earth and hasten down to the sands of Atbara, and there they remain while the rains last, this cruel enemy never daring to pursue them farther.

"What enables the shepherd to perform the long and toilsome journey across Africa, is the camel, emphatically called the Ship of the Desert. Though his size is immense, as is his strength, and his body covered with a thick skin, defended with strong hair, yet still he is not able to sustain the violent punctures this fly makes with his proboscis. He must lose no time in removing to the sands of Atbara; for when once attacked by this fly, his body, head, and legs, break out into large bosses,

which swell, break, and putrefy, to the certain destruction of the creature. Even the elephant and rhinoceros, who, by reason of their enormous bulk, and the vast quantity of food and water they daily need, cannot shift to desert and dry places, as the season requires, are obliged to roll themselves in mud and mire, which, when dry, coats them over like armour, and enables them to stand their ground against this winged assassin; yet have I found some of these tubercles upon almost every elephant and rhinoceros that I have seen, and attribute them to this cause."

There are twelve species of this insect.

All the inhabitants of the country are obliged to put themselves in motion, and remove to the next sand in the beginning of the rainy season, to preserve their stock of cattle from being destroyed. This is not a partial emigration; all the inhabitants, round about for a great extent, are, once a year, obliged to change their abode, and seek protection in the sands; nor is there any alternative, or means of avoiding this, even though an armed enemy was in their way strong enough to plunder them of half their substance.

THE GNAT.

These insects, so well known by the severe wounds they inflict, and the itching pain they cause, afford an interesting history. Before they turn to flying insects, they have been, in some measure, fishes under two different forms. From the beginning of May till winter, small grubs may be seen with their heads downward, and their hinder parts on the surface of the water, from which part arises sideways, a kind of vent-hole, or small hollow tube, like a funnel, and this is the organ of respiration. The head is armed with hooks, that serve to seize on insects, and bits of grass, on which it feeds. On the sides are placed four small fins, by the help of which the insect swims about, and dives to the bottom. These larvæ retain their form during a fortnight or three weeks, after which period they turn to chrysalids. All the parts of the winged insect are distinguishable through the outward robe that shrouds them. The chrysalids are rolled up into spirals.

These chrysalids, constantly on the surface of the water, in order to draw breath, abstain now from eating, but, upon the least motion, are seen to unroll themselves, and plunge to the bottom, by means of little paddles situated at their hinder part. After three or four days

of strict fasting, they pass to the state of Gnats. A moment before, water was the element of the little creature, but now become a winged insect, he can no longer subsist in it. He swells his head, and bursts his enclosure. The robe he lately wore, turns to a ship, of which the insect is the mast and sail. If at the instant when the Gnat displays his wings, there arises a breeze, it proves to him a dreadful hurricane: the water gets into the ship, and the insect, who is not yet loosened from it, sinks, and is lost. But in calm weather, the Gnat forsakes his slough, dries himself, flies into the air, and seeks to pump the alimentary juice of leaves, or the blood of men and beasts. It is impossible to behold, and not to admire, the amazing structure of its sting: what the naked eye discovers, is but a tube containing five or six stings of exquisite minuteness, some marked at their extremity, like the head of an arrow, and sharp-edged like razors. These stings introduced into the veins, act as pump-suckers, into which the blood ascends, by reason of the smallness of the tubes. The insect injects a small quantity of liquor into the wound, by which the blood becomes more fluid, and is seen through the microscope, passing through these stings. The animal swells, grows red, and does not quit its hold, till it has gorged itself. The liquor it has injected, causes, by its irritation, that disagreeable itching which we experience;

and which may be removed by volatile alkali, or by scratching the part newly stung, and washing it with vinegar. At night to rub it with fuller's earth and water, lessens the pain and inflammation.

The female deposits her eggs in the water, placing them in the form of a little boat. This vessel, composed of two or three hundred eggs, swims on the water for two or three days, after which they are hatched. If a storm arises, the boats are sunk. Every month, there is a fresh progeny of these insects. Were they not devoured by swallows, other birds, fish, and several carnivorous insects, the air would be darkened by them.

The little Gnat, in beauties, may compare,
With all its rival brothers of the air;
Transparent feathers, purple, green, and gold,
His wings, small feet, and fringed tail enfold;
Four sharpen'd spears, his head with weapons arm,
And his pearl'd eyes, with liveliest graces charm.

THE LOUSE.

The antipathies of mankind are various; some considering the toad, some the serpent, some the spider, some the beetle, with a strong degree of detestation: but while all wonder at the strangeness of each other's aversions, they all seem to unite in their dislike to the Louse, and regard it as their natural and most nauseous enemy. Indeed, it seems the enemy of man in the most odious degree; for, wherever wretchedness, disease, or hunger seize upon him, the louse seldom fails to add itself to the tribe, and to encrease in proportion to the number of his calamities.

It is needless, however, to go through the minute description of its form, the engraving of the animal, as seen through the microscope, affording a better idea of it than language could convey.

The louse has neither beak, teeth, nor any kind of mouth, for the entrance into the gullet is absolutely closed. In the place of all these, it has a proboscis, or trunk; or, as it may be otherwise called, a hollow sucker, with which it pierces the skin, and sucks the human blood, taking that for food only.

When it is empty, it is colourless; but when filled, it is plainly discernible, and its motion

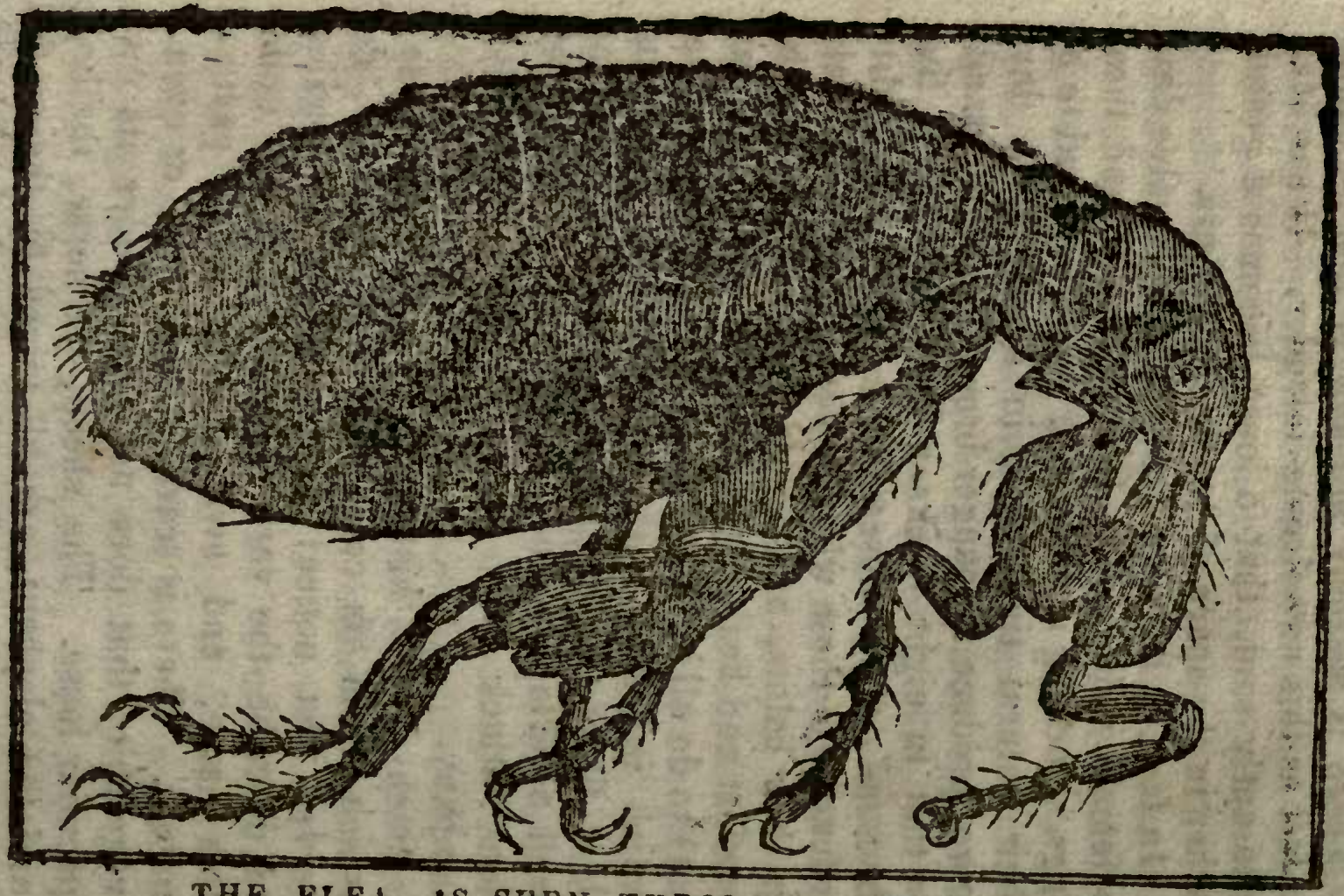
seems very extraordinary. It then appears working with very strong agitations, and somewhat resembles an animal within an animal. Superficial observers are apt to take this for the pulsation of the heart; but, if the animal be observed when it is sucking, it will then be found that the food takes a direct passage from the trunk to the stomach, where the remainder of the old aliment will be seen mixing with the new, and agitated up and down on every side.

If this animal be kept from food two or three days, and then placed upon the back of the hand, or any soft part of the body, it will immediately seek for food; which it will the more readily find, if the hand be rubbed till it grows red. The animal then turns its head, which lies between the two fore legs, to the skin, and diligently searches for some pore; when found, it fixes the trunk therein; and soon the microscope discovers the blood ascending through the head, in a very rapid, and even frightful stream. The Louse has, at that time, sufficient appetite to feed in any posture; it is then seen sucking with its head downward, and its tail elevated. If, during this operation, the skin be drawn tight, the trunk is bound fast, and the animal is incapable of disengaging itself: but it more frequently suffers from its gluttony, since it gorges to such a degree, that it is crushed to pieces by the slightest impression.

There is scarcely any animal that multiplies so fast as this unwelcome intruder. It has been pleasantly said, that a louse becomes a grand father in the space of twenty-four hours.

In fact, it has been found, that in twelve days a female will lay one hundred eggs, and these eggs, hatching in six days, which is found to be their natural time, will, in about thirty days more, produce a younger brood of five thousand; so that in eight weeks a louse might see five thousand of its descendants. This fecundity is fearful to those who are not sufficiently cleanly in their habits, and should induce them (if the comfort and health resulting from cleanliness can not) to do all in their power to keep down a race, which is armed with such means of punishing their filthy and disgusting carelesness; it being well ascertained, that in our climate they seldom attack any but such as invite their company.

Such is the history of the human louse; which, from its connection with mankind, deserves first notice: but it would be endless to describe the various tribes that go under this name, and swarm upon every part of nature. There is scarcely an animal, or even a vegetable, that does not suffer under its own peculiar louse. The sheep, the horse, the hog, and the elephant, are all teized by them; the whale, the shark, the salmon, and the lobster, are not without their company; while every



THE FLEA, AS SEEN THROUGH A MICROSCOPE.

hot-house, and every garden is infested with some peculiarly destructive. Linnæus tells us, that he once found a vegetable-louse upon some plants newly arrived from America; and willing to trace the little animal through its various stages, he brought it with him from London to Leyden, where he carefully preserved it during the winter, until it bred in the spring: but the louse it seems did not treat him with all the gratitude he expected; for it became the parent of so numerous a progeny, that it soon overran all the Botanic-garden of that beautiful city; and to this day, causes many a gardener to blame the Swede's too indulgent curiosity.

THE FLEA.

This insect, which is not only the enemy of mankind, but of the dog, cat, and several other animals, is found in every part of the world, but bites with greater severity in some countries than in others. Its numbers in Italy and France are much greater than in Ireland, and yet its bite is much more severe here than in any other place. It would seem that its force

encreased with the coldness of the climate: and though less prolific, that it became more troublesome. Perhaps, also, the slovenly and dirty habits of some classes may encourage its growth. In fact, mischievous as it is, we may almost always blame ourselves if exposed to its attacks; cleanliness of person, being always found an effectual means of banishing the little pest.

If the flea be examined with a microscope, it will be observed to have a small head, large eyes and a roundish body. It has two feelers or horns, which are short, and composed of four joints; and between these, lies its trunk, which it buries in the skin, and through which it sucks the blood in large quantities. The body appears to be all over curiously adorned with a suit of polished sable armour, neatly jointed, and beset with multitudes of sharp pins, almost like the quills of a porcupine. It has six legs, the joints of which are so adapted, that it can, as it were, fold them up one within another; and when it leaps, they all spring out at once, whereby its whole strength is exerted, and the body raised above two hundred times its own diameter.

The young fleas are at first a sort of nits or eggs, which are round and smooth: and from these proceed white worms, of a shining pearl colour; in a fortnight's time, they come to a tolerable size, and are very lively and active;

but if they are touched at this time, they roll themselves up in a ball: at this period, they cast their skins, and change into a chrysalis, which is of an oval shape, and exhibits through the outside covering, the limbs of the insect within. They then seek a place to hide in, where they spin a silken thread from their mouth, and with this, they enclose themselves in a small round bag, or case, as white within as writing paper, but dirty without: in this, they continue for a fortnight longer; after which they burst from their confinement perfectly formed, and armed with powers to disturb the peace of an emperor.

There is no kind of proportion between the force and size of all the insect tribe. Had man an equal degree of strength, bulk for bulk, with a louse or flea, the history of Samson would be no longer miraculous. A flea will drag after it a chain an hundred times heavier than itself; and to compensate for this force, will eat ten times its own weight of provisions in a day.

An ingenious watchmaker, who some years ago lived in the Strand, London, exhibited to the public, a little ivory chaise, with four wheels, and all its proper apparatus, and a man sitting on the box, all of which were drawn by a single flea. He made a small landau, which opened and shut by springs, with six horses harnessed to it, a coachman sitting on the box,

and a dog between his legs: four persons were in the carriage, two footmen behind it, and a postillion riding on one of the fore horses, which were all easily drawn along by a flea. He likewise had a chain of brass, about two inches long, containing two hundred links, with a hook at one end, and a padlock and key at the other, which the flea drew very nimbly along.

In the reign of Queen Elizabeth, a blacksmith, made a lock consisting of eleven pieces of iron, steel, and brass, with a hollow key to it, that altogether weighed but one grain of gold. He likewise made a gold chain, composed of forty-three links, which he fastened to the lock and key, and having put it about the neck of a flea, that little creature drew them with all ease; which being done in her Majesty's presence, he put the lock and key, flea and chain, into a pair of scales, and they altogether weighed but one grain and a half.

THE SPIDER.

The animal that next deserves our notice is the spider, whose manners are, of all others, the most subtle, and whose instincts are most various. Formed for a life of rapacity, and incapable of living upon any other than insect food, all its habits are calculated to deceive and surprize; it spreads toils to entangle its prey: it is endued with patience to expect its coming; and is possessed of arms and strength to destroy it when fallen into the snare.

In this country, where human industry, assisted by the goodness of Providence, keeps down the insect tribes, the spiders are but small and harmless. But they form a much more terrible tribe in Africa and America. In those regions, where all the insect species acquire their greatest growth, where the butterfly is seen to expand a wing as broad as our sparrow, and the ant to build an habitation as tall as a man, it is not to be wondered at that the spiders are seen bearing a proportionable magnitude. In fact, the bottom of the Martinico spider's body is as large as a hen's egg, and covered all over with hair. Its web is strong, and its bite dangerous. It resides among trees, frequently seizing on small birds, which it destroys, by wounding them with its fangs, and afterwards sucking their blood. It

is happy for us, however, that we are placed at a distance from these formidable creatures, and that we can examine their history without feeling their resentment.

Spiders have several eyes all round the head, brilliant and acute; these are sometimes eight in number, sometimes but six; two behind, two before, and the rest on each side. Like all other insects, their eyes are immoveable; and they want eye lids; but this organ is fortified with a transparent horny substance, which at once secures and assists their vision. As the animal procures its subsistence by the most watchful attention, so large a number of eyes was necessary to give it the earliest information of the capture of its prey. They have two pincers on the fore-part of the head; rough, with strong points, toothed like a saw, and terminating in claws like those of a cat. A little below the point of the claw there is a small hole, through which the animal emits a poison, which though harmless to us, is sufficiently capable of instantly destroying its prey. Though this slit is almost imperceptible in the small spider, it is quite obvious in the fangs of the bird-catching spider which we have mentioned above. This is the most powerful weapon they have against their enemies; they can open or extend these pincers as occasion may require; and when they are undisturbed, they suffer them to lie one upon the other, never opening them but when there is a neces-

ally for their exertion. They have all eight legs, jointed like those of lobsters, and similar also in another respect; for, if a leg be torn away, or a joint cut off, a new one will quickly grow in its place, and the animal will find itself fitted for combat as before. At the end of each leg, there are three crooked moveable claws; namely, a small one, placed higher up, like a cock spur, by the assistance of which, it adheres to the threads of its web. There are two others larger, which meet together like a lobster's claw, by which they can catch hold of the smallest depressions, walking up or down very polished surfaces, on which they can find inequalities that are imperceptible to our grosser sight. But when they walk upon such bodies as are perfectly smooth, as looking glass, or polished marble, they squeeze a little sponge, which grows near the extremity of their claws, and thus diffusing a glutinous substance, adhere to the surface, until they make a second step. Besides the eight legs just mentioned, these animals have two others, which may more properly be called arms, as they do not serve to assist motion, but are used in holding and managing their prey.

The spider, though thus formidably equipped, would seldom prove successful in the capture, were it not equally furnished with other instruments to assist its depredations. As it lives wholly upon flies, and is without wings to pursue them, it is obvious they must for

ever escape so impotent an adversary; but the spider is a most experienced hunter, and spreads its nets to catch those animals it is unable to pursue. The spider's web is generally laid in those places where flies are more apt to come and shelter; in the corners of rooms, round the edges of windows; and in the open air among the branches of trees.

For the purpose of making this web, Nature has supplied this animal with a large quantity of glutinous matter within its body, and the means of spinning it into thread. This substance is contained in a little bag, and at first sight, it resembles soft glue; but, when examined more accurately, it will be found twisted into many coils of an agate colour, and upon breaking it, the contents may be easily drawn out into strings, from the tenacity of the substance, not from those threads being already formed. Those who have seen the machine by which wire is spun, will have an idea of the manner in which this animal forms the thread of its little net, the orifices through which the thread is drawn, contracting, or dilating at pleasure. The threads which we see, and which appear so fine, are, notwithstanding, composed of five joined together, and these are many times doubled when the web is in formation.

When a house-spider proposes to begin a web, it first makes a choice of some commodious spot, where there is an appearance of plunder

and security. The animal then distils one little drop of its glutinous liquor, which is very tenacious, and then creeping up the wall, and joining its thread as it proceeds, it darts itself in a very surprising manner, as has often been seen, to the opposite place, where the other end of the web is to be fastened. The first thread thus formed, drawn tight, and fixed at each end, the spider then runs upon it, backward and forward, still assiduously employed in doubling and strengthening it, as upon its force depends the strength and stability of the whole. The scaffolding thus completed, the spider makes a number of threads parallel to the first, in the same manner, and then crosses them with others; the clammy substance of which they are formed, serving to bind them, when newly made, to each other. The insect, after this operation, doubles and trebles the thread that borders its web, and secures the edges, so as to prevent the wind from blowing the work away. The edges being thus fortified, the retreat is next to be attended to; and this is formed like a funnel at the bottom of the web, where the little creature lies concealed. To this are two passages, or outlets, one above, the other below, very artfully contrived, to give the animal an opportunity of making excursions at proper seasons, of prying into every corner, and cleaning those parts which are observed to be clogged or encumbered. Still attentive to its web, the spider,

rom time to time, cleans away the dust that gathers round it, which might otherwise clog and incommode it: for this purpose, it gives the whole a shake with its paws; proportioning the blow so as not to endanger the fabric. It often happens also, that from the main web there are several threads extended at some distance on every side: these are, in some measure, the outworks of the fortification, which whenever touched from without, the spider prepares for attack or self-defence. If the insect striking against it be a fly, it springs forward with great agility; if, on the contrary, it be the assault of an enemy stronger than itself, it keeps within its fortress, and never ventures out till the danger is over. Another advantage which the spider reaps from the contrivance of a cell or retreat behind the web, is that it serves for a place where the creature can feast upon its game with safety, and conceal the fragments of those carcases which it has picked, without exposing to view any thing that might create a suspicion in any insects that their enemy was near.

It often happens, however, that the wind, or the rustling of the branches, or the approach of some large animal destroys its labours: in this case, the spider is obliged to remain a patient spectator of the ruin; and when the danger is over, it sets about repairing the calamity. For this purpose, it is furnished with a large store of the glutinous substance of which

the web is made; and with this, it either makes a new web, or patches up the old one. In general, however, the animal is much fonder of mending than making, as it is furnished originally with but a certain quantity of glutinous matter, which, when exhausted, nothing can renew. The time seldom fails to come, when their reservoirs are entirely dried up, and the poor animal is left to all the chances of irretrievable necessity. An old spider is thus frequently reduced to the greatest extremity; its web is destroyed, and it wants the materials to make a new one. But as these animals have been long accustomed to a life of shifting, it hunts about to find out the web of another spider, younger and weaker than itself, with whom it ventures a battle. The invader generally succeeds; the young one is driven out to make a new web, and the old one remains in quiet possession; if, however, the spider is unable to dispossess any other of its web, it then endeavours for a while to subsist upon accidental depredation; but, in two or three months, it inevitably dies of hunger.

The garden spider seems to work in a different manner. The method with this insect is to spin a great quantity of thread, which floating in the air in various directions, happens, from its glutinous quality, at last to stick on some object near it, a lofty plant or the branch of a tree. The spider only wants to have one end of the line fast, in order to secure and

tighten the other. It accordingly draws the line, when thus fixed, and then making use of it as a bridge, passes and repasses upon it, strengthening the thread in such a manner as to answer all its intentions. The first cord being thus stretched, the spider walks along a part of it, and there fastens another, and dropping from thence, fastens the thread to some solid body below, then climbs up again, and begins a third, which it fastens by the same contrivance; when three threads are thus fixed, it forms a square, or something that very nearly resembles one: and in this the animal is generally seen to reside.

The spider's web being thus completed, and fixed in a proper place, its next care is to seize and secure whatever insect happens to be caught in the toil. For this purpose, it remains weeks and even months upon the watch, without ever catching a single fly; for the spider, like most other insects, is surprisingly patient of hunger. It sometimes happens that too strong a fly strikes itself against the web, and thus, instead of being caught, tears the net to pieces. In general, however, the butterfly or hornet, when they touch the web, fly off again, and the spider seems no way disposed to interrupt their retreat. The large blue-bottle-fly, the ichneumon-fly, and the common meat-fly, seem to be its favourite game. When one of these strike into the toils, the spider walks leisurely forward, seizes its prey, and instantly kills it, by instilling a ve-

nomous juice into the wound it makes. If, however, the fly be not entirely immeshed, the spider patiently waits, without appearing until its prey has fatigued itself by its struggles to obtain its liberty. If the spider has fasted for a long time, it then drags the fly immediately into its hole, and devours it; but if there has been plenty of game, and the animal be no way pressed by hunger, it then gives the fly two or three turns in its web, so as completely to immesh it, and there leaves it until it comes to its appetite. Why the spider should at one time kill its prey, and, at another, suffer it to struggle in the toils for several hours together, it is difficult to say: perhaps it only likes its prey newly killed, and therefore delays to put the captive to death until it is to be eaten.

The female generally lays from nine hundred to a thousand eggs in a season; they are of a bluish colour, speckled with black, and separated from each other by a glutinous substance, not unlike frog-spawn water. These eggs are large or small in proportion to the size of the animal that produces them. In some they are as large as a grain of mustard seed; in others, they are scarcely visible. The female never begins to lay till she be two years old at the least, and her first brood is never so numerous as when she has come to her greatest maturity.

When the number of eggs which the spider has brought forth have remained for an hour or two to dry after exclusion, the little animal then

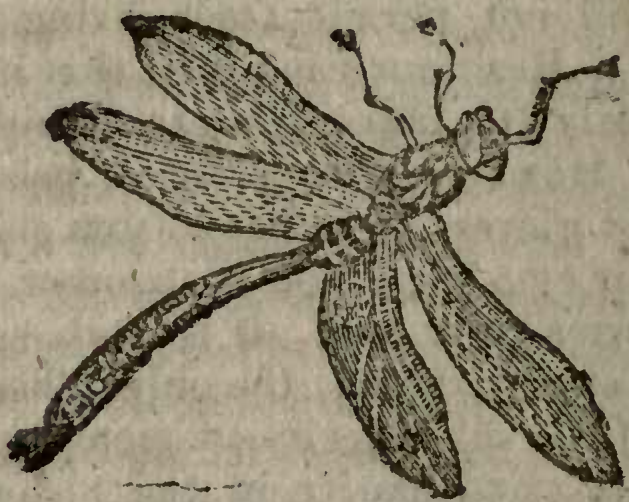
prepares to make them a bag, where they are to be hatched until they leave the shell. For this purpose, she spins a web four or five times stronger than that made for catching flies; and besides, lines it inside with a down, which she plucks from her own breast. This bag, when completed, is as thick as paper, is smooth within side, but rougher without. Within this they deposit their eggs; and it is almost incredible to relate the concern and industry which they bestow in the preservation of it. They stick it, by means of their glutinous fluid, to the end of their body; so that the animal, when thus loaded, appears as if she had one body placed behind another. If this bag be separated from her by any accident, she employs all her assiduity to stick it again in its former situation, and seldom abandons her treasure but with her life. When the young ones are excluded from their shells, within the bag, they remain for some time in confinement, until the female, instinctively knowing their maturity, bites open their prison, and sets them free. But her parental care does not terminate with their exclusion; she receives them upon her back for some time, until they have strength to provide for themselves, when they leave her, never to return, and each begins a separate manufactory of its own. The young ones begin to spin when they can scarcely be discerned; and prepare for a life of plunder before they have strength to overcome. Indeed, Nature seems to have formed them in every respect for

a life of hostility. No other insect is possessed of such various powers of assault and defence; and they are able to destroy animals ten times bigger than themselves. Even after a severe defeat, they quickly recover of their wounds; and as for their legs, the loss of them is but a small misfortune, as they grow again very speedily to their former magnitude.

Thus there is no insect to which they are not an enemy: but what is more strange still, spiders are the enemies of each other. Mr. Reaumur, who was fond of making experiments upon insects, tried to turn the labour of the spider to human advantage, and for this purpose, he collected a large number of those insects together, and took care to have them constantly supplied with such food as spiders are particularly fond of. But notwithstanding all his care, it was found impossible to rear them, on account of the malignant disposition of these animals, which will not permit their living peaceably together. Reaumur computed that it would require nearly 700,000 spiders to furnish a pound of silk. However, two or three pair of stockings, and gloves, were made from the silk that lines their egg-bags, and is stronger than that which forms their web. It is easily spun into a fine and strong thread, the only difficulty being to collect the silk-bags in sufficient quantities.

Another particularity in the history of the spider, is its power of flight, which is chiefly exercised by the young, and seems possessed

an inferior degree by those which are full grown. When inclined to make these journeys through the air, which is principally in autumn, the spider climbs to the top of a wall, or the branch of a tree, and emits from its teats several threads, which being caught by the wind, carry the little traveller suspended to them, above the highest trees. During their flight, it is probable that spiders employ themselves in catching such small insects as fall in their way: when satisfied, they suffer themselves to fall, by gathering up their legs, thus making themselves less buoyant, and gradually disengaging themselves from the thread which supports them.



THE WALKING LEAF.

Dr. Sparman relates, that when at the Cape of Good Hope, he observed this insect at noontide among the branches of a shrub—Though the air (says he) was extremely still and calm, so as hardly to have shaken an aspen-leaf, yet I thought I saw a little withered, pale, crumpled leaf, eaten as it were by caterpillars, flittering from the tree. This appeared to me so very extraordinary, that I thought it worth my while to contemplate it more closely: and I could scarcely believe my eyes, when I saw a live insect, in shape and colour resembling the fragment of a withered leaf, with the edges turned up, and eaten away as by caterpillars, and, at the same time, all over beset with prickles. Nature, by this peculiar form, has certainly extremely well defended and concealed this insect from birds, and its other foes; in all probability with a view to preserve it, and employ it for some important office in the system of her economy,—A system with which we are too little acquainted; but which, in every part of it, calls forth our respect and veneration to the great Author of Nature and Ruler of the Universe.

THE BUG.

The Bug is another of those nauseous insects that intrude upon the retreats of mankind; and often banish sleep. By day it lurks, like a robber, in the most secret part of the bed; takes the advantage of every chink and cranny, to make a secure lodgment, and contrives its habitation with so much art, that scarcely any industry can discover its retreat. It seems to avoid the light with great cunning; and even if candles be kept burning, this formidable insect will not issue from its hiding-place. But when darkness promises security, it then issues from every corner of the bed, and travels with great assiduity to the unhappy patient, who vainly wishes for rest and refreshment.

Nor are these insects less disagreeable from their nauseous stench, than their unceasing appetites. When they begin to crawl, the whole bed is infected with the smell; but if they are accidentally killed, then it is insupportable.

Happily, however, for Great Britain and Ireland, they multiply less in these islands than in any part of the continent. In France and Italy, the beds, particularly in their inns, swarm with them; and every piece of furniture seems to afford them a retreat. They grow larger also with them than with us, and bite with more cruel appetite.

This animal, if examined minutely, appears to consist of three principal parts; the head, the corslet, and the belly. It has two brown eyes, that are very small, and a little prominent, besides two feelers, with three joints; underneath these, there is a crooked trunk, which is its instrument of torture, and which, when not in motion, lies close upon the breast. The breast is a kind of ring, in which are placed the two first pair of legs. The belly consists of nine rings; under which are placed two pair of legs more, making six pair in all. Each leg has three joints, which form the thigh, the leg, and the foot, which last is armed with a crooked claw, like an hook. The body is smooth, except a few short hairs, that may be seen by the microscope, about the vent, and on the two last rings. Its motion is slow and unwieldy; yet its sight is so exquisite, that the instant it perceives the light, it generally makes good its retreat; and they are seldom caught, though the bed swarms with them.

The male and female of these animals are plainly distinguishable from each other; the female has an ovary filled with eggs, joined together like a bunch of grapes; each egg being oblong, almost cylindrical, inclining to white, and pretty transparent. In about two days, she deposits her eggs, to the number of about one hundred and fifty, in some convenient place where they are likely to receive no disturbance. There they continue for some months; during

which time, neither cold nor heat, neither moisture nor fumigation, can in the least retard their exclusion; but they come forth active, and ready for mischief. It is this hardiness in the shell that seems to continue the breed; as the old ones die every winter, or are easily destroyed by any fumigation that is used for that purpose. But the egg seems incapable of destruction; even those men who make a livelihood by killing these nauseous insects, though they can answer for the parent, can never be sure of the egg. For this reason they usually pay those houses to which they are called, a second or a third visit, and at last exterminate them by perseverance.

Cleanliness seems to be the best antidote to remove them; and wherever that is wanting, their increase seems but a just punishment. Indeed, they are sometimes found in such numbers among old furniture, and neglected chambers, exposed to the south, that, wanting other sustenance, they devour each other. They are also enemies to other vermin, and destroy fleas very effectually, so that we seldom have the double persecution of different vermin in the same bed. Of the bug kind Linnæus reckons up forty.

THE SCOLOPENDRA.

Of this hideous and angry insect we know little, except the figure and the noxious qualities. With us, they seldom grow above an inch long; in the tropical climates they are often found above a quarter of a yard.

The Scolopendra is otherwise called the Centipes, from the number of its feet: and is very common in the middle parts of the earth. Those of the East Indies, are about six inches long, and as thick as a man's finger: they consist of many joints; and from each joint is a leg on each side; they are covered with hair, and seem to have no eyes; but there are two feelers on the head, by which they find out the way they are to pass: the head is very round, with two sharp teeth, with which they inflict wounds that are very dangerous. A sailor that was bit by one, felt an excessive pain, and his life was supposed to be in danger; however, he recovered, by the application of roasted onions to the part. Of this animal there are different kinds; some living, like worms, in holes in the earth; others under stones, and among rotten wood; so that nothing is more dangerous than removing those substances, in the places where they breed.

THE LEECH.

The next that we shall mention is the Leech, which undergoes no transformations; but when once excluded from the body of the parent, preserves its first figure to the end. The leech, from its uses in medicine, is one of those insects that man has taken care to provide for; but of a great variety, one kind only is considered as serviceable. The horse-leech, which is the largest of all, and grows to four inches in length, with a glossy black surface, is of no use, as it will not stick to the skin. The snail-leech is but an inch in length, and though it will stick, is not large enough to extract a sufficient quantity of blood from the patient; the broad-tailed leech, which grows to an inch and a half in length, with the back raised into a sort of a ridge, will stick but on very few occasions; it is the large brown leech, with a whitish belly, that is made use of in medicine, and whose history best merits curiosity.

The leech has the general figure of a worm, and is about as long as one's middle finger. Its skin is composed of rings, by means of which it is possessed of its agility, and swims in water. It contracts itself, when out of water, in such a manner, that when touched it is not above an inch long. It has a small head,

and a black skin, edged with a yellow line on each side, with some yellowish spots on the back. The belly also, which is of a reddish colour, is marked with whitish yellow spots. But the most remarkable part of this animal is the mouth, which is composed of two lips, that take whatever form the insect finds convenient. When at rest, the opening is nearly triangular; and within it are placed three very sharp teeth, capable of piercing not only the human skin, but also that of an horse or an ox; still deeper in the head, is discovered the tongue, which is composed of a strong fleshy substance, and which serves to assist the animal in sucking, when it has inflicted its triple wound; for no sooner is the voracious creature applied to the skin than it buries its teeth therein, then closes its lips round the wounds which it has made; and thus, in the manner of a cupping-glass, extracts the blood as it flows to the different orifices.

But it is not in this instance alone that the leech differs from all other insects. It was remarked in a former chapter, that the whole insect tribe had the opening into their lungs placed in their sides, and that they breathed through those apertures as other animals do through their mouth. A drop of oil poured on the sides of a wasp, a bee, or a worm, would quickly suffocate them, by stopping up the passages through which they breathe; but it is

otherwise with the leech, for this animal may be immersed in oil without injury; nay, it will live therein; and the only damage it will sustain is, that when taken out, it will be seen to cast a fine pellucid skin, exactly of the shape of the animal, after which it is as alert and vigorous as before. It appears from hence, that the leech breathes through the mouth; and, in fact, it has a motion that seems to resemble the act of respiration in more perfect animals: but concerning all this, we are very much in the dark.

This animal seems to differ from all others in several respects; the rest of the reptile tribe are brought forth from eggs; the leech produces her young alive, one after the other, to the number of forty or fifty at a birth. The young ones are found in the month of July, in shallow running waters, particularly where they are tepified by the rays of the sun. The large ones are chiefly sought after; and being put into a glass vessel filled with water, they remain for months, nay, for years, without taking any other subsistence. But they never breed in this confinement; and, consequently, what regards that part of their history still remains obscure.

In this part of the world they seldom grow to above four inches; but in America and the East, they are found from six to seven. Their pools there abound with them in such numbers, that it would be dangerous bathing there, if for no other consideration. Our sailors and soldiers,

who, the last war, were obliged to walk in those countries through marshy grounds, talk with terror of the number of leeches that infested them on their march. Even in some parts of Europe they encrease so as to become formidable. Sedelius, a German Physician, relates, that a girl of nine years old, who was keeping sheep near the city of Bomst, in Poland, perceiving a soldier making up to her, went to hide herself in a neighbouring marsh, among some bushes; but the number of leeches was so great in this place, and they stuck to her so close, that the poor creature expired from the quantity of blood which she lost by their united efforts. Nor is this much to be wondered at, since one of those insects that, when empty, generally weighs but a scruple, will, when gorged, weigh more than two drachms.

When leeches are to be applied, the best way is to take them from the water in which they are contained about an hour before, for they thus become more voracious, and fasten more readily. When full with blood, they generally fall off of themselves; but if it be thought necessary to take them from the wound, care should be used to pull them very gently, or even to sprinkle them with salt, if they continue to adhere; for, if they be plucked rudely away, it frequently happens that they leave their teeth in the wound, which makes a very troublesome inflammation, and is often attended with danger.

If they be slow in fixing to a part, they are often enticed by rubbing it with milk or blood, or water mixed with sugar. As salt is a poison to most insects, many people throw it upon the leech when it has dropped from the wound, by which means it disgorges the blood it has swallowed, and is then kept for repeated application. They seldom, however, stick after this operation; and as the price is but small, fresh leeches should always be applied whenever such an application is thought necessary.

THE SNAIL.

The eyes of the Garden Snail are placed in its horns, one at the end of each horn, which he can draw in at pleasure. The microscope not only discovers the heart beating just against the round hole near the neck, which seems the place of respiration, but also the liver, spleen, stomach, and intestines, with the veins, arteries, mouth, and teeth, are plainly observable. The intestines of this creature are green, from its eating herbs, and are branched all over with fine capillary whitish veins; the mouth is like a hare's or rabbit's, with four or six needle teeth, resembling those of leeches, and of a substance like horn.

Cowper gives the following pretty description of this animal:—

WITHIN his house secure he hides,
When danger imminent betides
Of storm, or other harm besides
Of weather.

Give but his horns the slightest touch,
His self-collecting power is such,
He shrinks into his house with much
Displeasure.

Where'er he dwells, he dwells alone,
Except himself has chattels none,
Well satisfied to be his own
Whole treasure.

Thus, Hermit-like, his life he leads,
Nor partner of his banquet needs,
And, if he meets one, only feeds
The faster.

ON CRUELTY TO INSECTS.

I WOULD not enter on my list of friends
(Tho' graced with polished manners and fine sense
Yet wanting sensibility) the man,
Who needlessly sets foot upon a worm.
An inadvertent step may crush the snail
That crawls at evening in the public path;
But he that has humanity, forewarned,
Will tread aside, and let the reptile live.
The creeping vermin, loathsome to the sight,
And charged perhaps with venom, that intrudes,
A visiter unwelcome, into scenes
Sacred to neatness and repose, the alcove,
The chamber, or refectory, may die:
A necessary act incurs no blame.
Not so when, held within their proper bounds,
And guiltless of offence, they range the air,
Or take their pastime in the spacious field:
There they are privileged; and he that hunts
Or harms them there, is guilty of a wrong,
Disturbs th' economy of Nature's realm,
Who, when she formed, designed them an abode.
The sum is this: if man's convenience, health,

Or safety interfere, his rights and claims
Are paramount, and must extinguish theirs,
Else they are all — the meanest things that are,
As free to live, and to enjoy that life,
As God was free to form them at the first,
Who in his sovereign wisdom made them all.
Ye therefore, who love MERCY, TEACH YOUR SONS
TO LOVE IT TOO.

James Scott

51.

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